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Agriculture.

CO-OPERATION FOR FARMERS.

Some years ago, at an agricultural conference held at Warwick, Mr. C. P. Mau read a paper on "Co-operation and how to make use of it." It may be well to consider his arguments in favour of co-operation in these times of high prices for food, machinery, stock, &c.—the result of the war and of the high wages demanded by workers in all branches of industry, rural and urban. Mr. Mau said:—

"Co-operation is the uniting together of a number of individuals for the purpose of obtaining food or other supplies at the cheapest rates. There are several uses to which co-operation may be applied, namely:—1st, for the purpose of distribution; 2nd, for a number of men to buy from the middleman; 3rd, to buy directly from the factory or wholesale houses. Most people do not realise these principles unless they have a fall-out with their storekeeper. Now, in my opinion, that is wrong. Co-operation should be used particularly amongst small farmers, to enable them to get their supplies as cheaply—that is, at the same rate—as the large estate holders who are able to buy at wholesale prices.

"Or take the middleman, for instance. What does he do? He buys wholesale for the simple reason that he can get his goods cheap. Therefore, when farmers from year to year notice how the big estates and tradesmen buy wholesale, should they not co-operate to follow their example rather than raise a cry out against the fat man as usual?

"We must take a pattern from him how to do the business.

"I will refer you to the three methods before mentioned:—

"First.—To start without a fixed capital we should organise as strong a body of farmers as possible. They must, in fact, all and each one, form a group to buy their supplies at one place. Tenders must be called for periodically to get quotations. Then it is as plain as daylight that the small farmers will be able to buy at wholesale prices as well as the tradesman. In fact, it strikes me that the co-operative farmers might get a tradesman to quote goods as cheaply as if they appointed their own agent to buy.

"Second.—The group of farmers united together as above should register themselves as a limited liability company for the purpose of buying their own stores, and subscribe among themselves sufficient to buy, say, one month's supply. Suppose the group to consist of fifty members, and that each member, on an average, would require £5 worth of goods for the month. This would amount to a total expenditure of £250 on the first order. At this stage it will be necessary to appoint from amongst the group, if possible, a reliable business man to act as buyer and salesman for the company, and to him must be handed over the sum subscribed to buy goods wherever he best can in the cheapest market. The goods, on delivery, must be kept together in a warehouse or a shed, and thence distributed to the members of the society when needed. A strict account must be kept of the goods delivered to members, and the amount of their value must be handed to the salesman to keep his stock of goods up to the same standard as at the beginning. New members can join at any time, when approved of by the company, by handing to the salesman the sum of money required to buy the goods they are in need of.

"It goes without saying that the more members the greater the success. I wish to point out that a co-operative company on the above lines cannot fail, because we should not be dependent on customers. We buy our own goods and make our own profits, and each member will get his or her share of the profit proportionate to the money they had spent by getting their goods at wholesale prices. I will remark that no one is able to undersell a company established on the above lines, for this reason: If our salesman discovers that a firm is quoting below his company he can at once go and buy from that firm, and so be able to compete favourably.

"Should the business of the company increase to such an extent that the members should deem it advisable to start business with the public, nothing is simpler than to merge the contributions of members into a working capital, one share being given for each £1 subscribed standing to his or her credit.

"Then a co-operative store can be run on similar lines to others.

"I feel sure that my first, second, and third methods will do to work upon at first—to commence the system and to work it up thoroughly before launching out into a public co-operative association. We must

remember that to start a co-operative company requires large capital, which is not easy to get together for a lot of hard-struggling farmers. So it is well not to try to walk before we can creep—a man must be a boy before he becomes a man. Therefore, even 100 poor farmers will not make a capitalist. Hence, oftentimes co-operation goes down to ridicule, and is sneered at by its opponents.

"In conclusion, I will point out that agency companies established all over the State on the above method will enable the producer to be brought into direct contact with the consumer, and thereby get full value for his product. At the same time the consumer will get full value for his money. The system in vogue at present of letting all goods go through three or four agents, and finally the storekeeper, is what makes the small farmers suffer both in the North and South.

"Southern farmers produce everything in the way of produce that the Northern canegrower is in want of. I ask, in the name of the farmers I represent, shall we farmers South and North not make up our minds at last and put our shoulders to the wheel to do our business on the lines I have at least tried to explain to you for the good of the farmers? By doing so we shall make the farmers both North and South greatly better their condition, each being able to buy his requirements more cheaply and sell his produce at a better price; the latter, because the agency and other profits have not to come between the buyer and the seller. I can speak from personal experience of the benefits of co-operative buying on a small scale. Let us endeavour to apply throughout the length and breadth of Queensland a principle which is capable of bringing many benefits to our door, and eliminating a growing evil in trade which is filling our cities, depleting our farming districts, and adding nothing to the wealth or welfare of the State."

We might emphasise Mr. Mau's proposals by asking: If the Military, Naval, and Civil Services can support large stores that supply their members all over the country with "cheap" articles, why cannot farmers organise and support a movement which will benefit them in a similar manner? Why should they not join hands and pay a moderate annual subscription to an organisation of their own, and thus be able to purchase all their supplies on special terms through the duly-appointed trade agents of the society?

No capital to set up store-keeping would be required, as good terms could be made with agents.

In connection with co-operation and dairying, Mr. R. R. Kerr, Dairy Supervisor, Victoria, writes as follows in the "Journal of Agriculture" (10th May) on—

"CO-OPERATIVE OWNERSHIP OF BULLS.

"Of the many useful ways that co-operation could benefit the farmer, nothing would be more important than the principle applied to the buying and use of dairy sires. In all closer settlement dairying areas

the herds are on the small side, numbering 10, 12, or 20 odd cows. The keeping of a sire for so few a number of cows is not the best business arrangement, putting the farmer to unnecessary cost both in the buying and keeping of the bull.

"These small farms are generally handy one to the other. Can any strong argument be raised against one farmer caring for the bull and the neighbours bringing their cows across for service? Surely the neighbourly spirit is existing to that extent. The system advocated would be for three or four farmers to combine or co-operate and buy a good animal, and arrange between themselves as to whether one of the number should be paid for keeping the bull or whether each should care for him in turn. The price of a good sire from a tested dam with a 400-lb. fat record, although a splendid investment, has one deterrent in that it is an outlay of cash that the small farmer can ill afford, because he has to wait three years to get the benefit of his investment. One bull judiciously used can serve at least 50 cows. If £30 or £40 were divided between three or four farmers, the share of each would be £10—the price of the mongrel sire now so prominent. Were such a scheme adopted, its benefits would be manifold.

"The resultant progeny would have a much higher market value, and the returns from the increased yields would many times pay for the original investment.

"The improvement of herd yields is of national importance, considering the wealth of the dairying industry; and to the mind of the writer the selection of dairy sires is of equal importance to the industry as the certification of stallions to the horse breeders.

"Bulls from dams yielding 400 lb. fat are being slaughtered simply because dairymen do not know their value and refuse to give the few extra pounds asked for them. They are content to plod along using the mongrel sire, or, nearly as bad, the pure sire from a worthless dam, raising useless stock—living monuments to such limited intelligence. The purebred sire will always demonstrate his right to be called the foundation of the dairy industry.

"Too many who start in the business of breeding purebred animals become discouraged, because they do not reap handsome profits during the first two or three years. It is often a long journey from beginning in the breeding of purebred live stock to the position of a leader whose produce is in demand at high prices. Ten years is but a short time when it comes to establishing and making known a reputation as a real constructive and honest breeder, no matter in what line one may be engaged. Twenty years or more is often required to attain the fullness of confidence and recognition on the part of buyers of pure stock. It takes years to build up the good-will that goes with profit-making in any business where public confidence is an asset, and the breeding of live stock is no exception. If you feel that you have made a wise choice in the line of breeding you have selected, stay by your chosen breed. It will pay in the end. The in-and-out policy is neither constructive nor profitable."

THE VALUE OF POTASH IN AGRICULTURE.

In March, 1917, at the fourteenth ordinary meeting of the Royal Society of Arts, London, Dr. J. A. Voelcker, Ph.D., F.I.C., read a most interesting paper on "Fertilisers and their Supply in War Time." He dealt mainly with the points at issue, such as—What are the present conditions of supply, what are the needs, and how can these be best provided for?

"The most common of all fertilisers," he said, "is, of course, farmyard manure, comprising in itself the three constituents—phosphoric acid, nitrogen, and potash. The supply of it is, however, a regularly decreasing one, and the great rise in the price of feeding stuffs experienced since the war began made it increasingly expensive to produce. As a consequence, dependence will more and more have to be placed on artificial fertilisers.

"PHOSPHORIC ACID.

"Fertilisers that mainly supply phosphoric acid are superphosphate, basic slag, and ground phosphates.

"NITROGEN.

"Of two sources of nitrogen—nitrate of soda and sulphate of ammonia—the former is, to all intents, no longer available for agricultural purposes. Added to the difficulties of shipment—it all coming from the west coast of South America—is the fact that it is all required in connection with the manufacture of explosives, either directly or for making the all-essential nitric acid. When procurable at all, its price is £21 to £22 per ton, which, compared with sulphate of ammonia, now at £16 per ton, and containing one-third more nitrogen per ton, puts it 'out of court.' As between the two sources of nitrogen, it may be said generally that, though nitrate of soda was perhaps the favourite one with farmers, they will suffer little or nothing by the change. The superiority of one or the other is mainly a matter of season and price, and, to some lesser degree, of the land and the crop. Sulphate of ammonia is a few days slower in its action, but is preferable on clay land, just as nitrate of soda is to be chosen for chalk soils. Sulphate of ammonia is less readily washed out, and so does better in a wet season, and nitrate of soda in a dry. For potatoes and sugar-cane, sulphate of ammonia is to be preferred; for a hay crop, nitrate of soda. But the differences between their action are not such as to interpose any real difficulty now that only sulphate of ammonia is obtainable.

"POTASH.

"Lastly comes the consideration of potash-supplying materials, and these need not detain us long, for it is well known that, since the products of the Stassfurt mines ceased to come here, agriculturists have practically had to do without potash. Much has been said and written about the providing of a substitute for these salts; but, though seaweed, the ashes of hedge-clippings, bracken and other materials have been named, none of them have, except under quite local conditions, taken actual

shape. Still, from time to time, materials are brought forward that supply potash, though, so far, none of them exist in any great quantity. The refuse from beet-sugar purification, the 'argol' (tartrate of potash) obtained in the fermentation of wine, and the sweepings of flues in works where iron and manganese ores have been smelted, are all utilised so far as they go. The last-named material has about the same amount of potash that kainit contains (10 to 15 per cent.), the potash being present partly as sulphate and partly as carbonate. It would not appear, however, that the quantity of this available exceeds 3,000 tons annually. The present price is £7 to £9 per ton, or 7s. 6d. per unit per ton of sulphate of potash. For some time there has been talk of extensive deposits of potash salts in Catalonia (north of Spain), but nothing has so far been done to develop these. Indeed, I have heard it hinted that, previous to the war, the Stassfurt people were interesting themselves in the development of this source.

"Yet another supply has been heard of in potash salts of high quality, obtained by somewhat difficult refining, from districts bordering the Red Sea. These are sold on a basis of 80 per cent. sulphate of potash, and of them about 6,000 tons annually are said to be available. Peruvian guano, as already observed, contains some amount of potash, and so may acquire a special value at this time. The review of these supplies, and the fact that we are at the present time going on with our agriculture without renewing the potash supply, naturally raises the doubt as to whether the oft-preached doctrine of potash for crops has not been 'overdone.' Certain it is that the land is not yet suffering a potash starvation, and when I look at the Rothamsted records in the case of heavy land, and my own on light land (though carried out for a much briefer period), I confess that I fail to see the clear evidence of potash being as urgently required as has been put forward. No doubt there are certain crops—such as potatoes, mangels, clover, fruit, hops, &c.—which benefit largely from the application of potash; but if farmyard manure can be supplied in sufficiency it will probably give all the potash that is wanted, while for ordinary corn crops—such as wheat, barley, and oats—it is very questionable if potash is required under ordinary circumstances and in rotation-cropping. Indeed, I confess that I am beginning to wonder whether, just as with basic slag and the 'citrate solubility,' the need of potash for crop-growing has not, to a great extent, been the outcome of an enterprising 'trade policy' rather than a truth founded on actual facts of science and practice.

"However that be, I must say that I regard far less seriously than I did at first the shortage of potash salts so far as agriculture is concerned."

During the discussion which followed the reading of Dr. Voelcker's paper, Mr. J. W. Hughes said he agreed with the author that the value of potash had been over-estimated, as he knew of land which had received no potash dressing for twenty years, or farmyard manure or potash-containing manure of any kind, which had yet grown splendid crops of some kinds of vegetables, provided that it was supplied with nitrogen and phosphates. As regards potatoes, the non-application of 1 cwt. of

sulphate of potash had made, in twenty consecutive years, an average difference of 1 or 2 tons of potatoes an acre. Potash salts were useful in the case of potatoes, and when they could not be obtained, farmyard manure should be used, and withheld from such things as turnips and wheat which did not need it.

A NEW MAIZE SECRET.

Reports to hand by the last American mail announce an interesting development in maize-growing experiments. Certain tests have been conducted by officers of the School of Agriculture of the University of Minnesota. If future tests sustain the present indications, every bushel of maize planted may be made to send up more sprouts, and these sprouts may grow so fast that several weeks may be gained in the maturing time of the corn. Scientists at the Minnesota University Farm believe that they have discovered, quite by accident, a commercially practicable method of increasing the germination rate of seed maize. It came about in experimenting with various insecticides to be used in treating grains.

Professor Wm. Moore, of the Entomology Department, and Professor H. K. Hayes, of the Agronomy Department, have been working on fumigation processes for killing grain parasites. It is important that germination qualities of grain treated should not be impaired in fumigating, so they regularly checked plantings of the untreated. It was in connection with the use of nitro benzine that they bumped into the unexpected. They found that not only was the grain not impaired for seed purposes, but that it was actually bettered. Maize seemed to thrive on the fumes of nitro benzine. Not only was the percentage of germination increased by treatment, but the rate of germination also was speeded up. The experimenters checked and rechecked, again and again, with the same results. An experiment with 1911 maize, for instance, brought out the fact that the fumigated seeds sprouted nearly two days before the unfumigated when planted at the same time, and of the former about 18 per cent. more kernels germinated than of the latter.

"We are not saying that the treatment will so result with all corn," Professor Moore said, "as our experiments have not gone far enough to justify so sweeping a statement, but we expect to wind up the most significant test of all on the subject shortly, after which we shall have something to announce. Nitro benzine is an oil, a coal tar derivative. Its price has been raised somewhat by war causes, but it is commercially obtainable. We fumigate the corn by placing it in a closed box in which is suspended a cloth saturated with the oil. The fumes do the work. We think well enough of present indications to make known our findings at this time, so that American farmers who are facing a critical seed maize situation may try out the process if they see fit. Why does the treatment so affect the corn? We haven't the slightest idea. We only know that it has had that effect with corn we have treated."—"Producers' Review."

PRESERVING MAIZE IN TANKS.

When maize is about to be tanked, it is essential that the grain be thoroughly dry. Exposure to the sun beforehand of what may appear to be a dry sample is recommended. The tank itself should be dried by lowering a can containing red hot coals into it before putting in the maize. The secret of preserving maize in tanks when they are not properly filled is to exhaust the oxygen by placing a lighted candle above the maize, and hermetically sealing the tank. Should it be found necessary to fumigate at any time for the prevention of weevil, all that is necessary is to open the tank and treat the grain with bisulphide of carbon. The usual dose is 1½ to 3 lb. of bi-sulphide to every 100 bushels of grain, according to the tightness of the tank. The liquid is either poured into saucers or on to cotton waste placed in dishes put on top of the grain to be treated. The lid is then tightly fitted on and made air-tight. Twenty-four hours is quite long enough to allow the tank to remain unopened—that is, if the grain is required for seed purposes. Care must be exercised not to place a light or to smoke near the fumes of the bi-sulphide, as the substance explodes very readily. After 24 hours the tank should be opened at top and bottom to allow the fumes to escape; hence some opening should be provided at the bottom which can be hermetically closed.

SUN HEAT FOR KILLING WEEVILS IN MAIZE AND WHEAT.

Investigations have been conducted in Great Britain and South Africa as to the effect of high temperature on maize or wheat weevils. At Salisbury, in Rhodesia, a sail was spread out on the ground, and a sample of wheat heavily infested with weevils spread over it. The temperature on the sail was 116 degrees Fahr. When the wheat touched the hot sail, many weevils flew away; the remaining ones died in a few minutes. A sample of the weevilly wheat from the sail was then placed in a jar, and nearly six months later no more weevils had bred out. The exposure to the sun heat had evidently killed the weevils in all stages—eggs, larvæ, and perfect fly. Subsequent experiments proved that 115 degrees Fahr. was the desirable minimum. Similar results have been obtained at Grafton Experiment Farm, and this simple method of ridding grain of weevils can be confidently recommended to farmers. A black tarpaulin will be found to absorb more heat than a white one.—"Town and Country Journal."

COTTON-GROWING IN NEW MEXICO, U.S.A.

The cotton-growing districts of all tropical and sub-tropical zones are comprised between the parallels of 36 degrees north and 36 degrees south of the Equator. The territory of New Mexico lies between the parallels of 32 and 37 degrees north latitude, and is consequently well within the cotton belt of the United States. Lately, experiments were made there in cotton-growing, which resulted in proving that the

territory was eminently adapted to cotton production. In the trials cotton was planted in rows 40 inches apart at the rate of 20 lb. of seed to the acre. A bushel of seed contains 120,000 to 150,000 seeds. This quantity is enough, if all seeds germinate, to plant 15 acres. Generally, however, from three-quarters to one and a-half bushels are planted per acre. Taking a bale of cotton at 400 lb., the yield was:—Of Burnett's Cotton, 1·47 bales of lint per acre; Durango, 1·46 bales; Allen's Imperial Triumph, 1·37 bales. Generally a crop of 1,000 lb. of seed cotton will give 400 lb. of lint. The result of this trial shows that the yield of seed cotton was 1,500 lb. per acre; and 600 lb. lint, worth 10d. per lb., gave a return of £25 per acre. The whole of the cotton-growing area of Queensland extends from 29 degrees south to 10 degrees south latitude; and is, therefore, well adapted to cotton-growing.

MARKET GARDENING.

HERB-GROWING.

Previous to the war, culinary herbs were mainly imported from Europe, especially from France. That source of supply being cut off, buyers of herbs on a wholesale scale in Australia are looking to the States of the Commonwealth to supply the deficiency. The climate of Southern Queensland, especially on the coastal ranges, is eminently adapted to the successful cultivation of herbs. In districts where cost of carriage precludes the possibility of ordinary heavy crops being profitably produced, the herb industry particularly recommends itself to farmers on account of the smallness in bulk of its products when compared value for value with other products—such as hay, chaff, maize, potatoes, &c.

Herbs are generally easy to grow from seed. If plants can be obtained, so much the better. They may be sown or planted out at any time between April and August. Where plants are not obtainable, the seed should be sown in rows drawn 1 foot apart, just deep enough to cover the seed. When the plants are up, they must be thinned out to 1 foot apart. During the summer, they must be well watered, the surface of the soil being kept loose and mulched. In autumn or early spring, to extend the area, take up and divide some roots, planting them 18 inches apart. New plantings should be made every winter, in order to supply the places of any that may have died out during the summer.

A MARKET FOR HERBS.

The most useful herbs, and in greatest demand commercially, are:—Marjoram, Sage, and Thyme; and with reference to the wholesale prices for these, the Department of Agriculture and Stock has received from Messrs. Loughland, Mackay, and Co., Australasia, Ltd., 235 Edward street, Brisbane, a letter in reply to an inquiry from the Department on the subject.

The above firm are desirous of purchasing the herbs named in considerable quantities, provided a decent sample can be offered, the buyers paying cash on delivery. At present supplies of such herbs cannot be obtained from Europe; hence an undoubtedly good opportunity is afforded to farmers and others in Southern Queensland to produce Australia's requirements in this line.

The firm quote prices which they paid in the past for rubbed, dried herbs, such as Marjoram, Thyme, and Sage, as follows:—

Marjoram, 50s. 9d. per cwt.; Thyme, 23s. 6d. per cwt.; Sage, 29s. 6d. per cwt. These prices are c.i.f. Australian ports. To them would have to be added local landing charges—about 10s. per ton of 40 cubic feet, and duty at the rate of 4d. per lb.—bringing the actual price of the imported article to 88s. per cwt. for Marjoram, 60s. 9d. for Thyme, and 66s. 9d. for Sage. The main difficulty would be the picking; but this could easily be done by female labour, as it is fairly light work.

THE CULTIVATION OF CULINARY HERBS.

SAGE.—Sage grows well in parts of Queensland, but does not like much heat. On the high coastal lands—as at Toowoomba, Warwick, Stanthorpe in the South-West, and Herberton in the North—it thrives well. It is easily propagated by cuttings, and, if planted about 15 to 18 inches apart each way, will soon cover the ground and keep down weeds. The dried leaves find a ready sale. According to the labour available, the plants may be hand-stripped, or cuttings may be made two or three times a year.

THYME.—Unlike the Sage plant, Thyme is able to stand a good deal of heat. It requires the same treatment in planting as Sage. Along with other culinary herbs, it is largely imported in a dry state for flavouring purposes, being very largely used in the butchering trade.

MARJORAM.—Plants may be raised from cuttings planted, say, in April if the weather be mild; but a better plan is to divide old plants into as many single-stemmed plants with a root or two as possible. These should be planted in well-worked ground at distances of 18 to 20 inches apart each way. A couple of chippings with the hand cultivator will be all that is necessary to keep down weeds, as the plants soon cover the ground. Two or three cuttings may be made every year. There is a very considerable demand for the dried leaves. As in the case of Thyme and Sage, Marjoram requires a deep, friable, loamy soil and a temperate climate, under which conditions it will grow to a height of 18 inches.

The leaves of herbs must not be dried in the sun or near a fire.

HERB-GROWING FOR WOMEN.

"Before the war Australia imported annually £10,000 worth of culinary herbs." What a staggering piece of information is this, given us in a bright and practical article, by Miss Annie S. Evans, in a Melbourne newspaper recently. With all our natural advantages and opportunities for growing herbs, to think that we have been importing them at this rate. We have no excuse but ignorance and indolence. Some of us are ignorant, some are indolent, some are both.

When the continental market was closed and the shortage began to assume serious proportions, and the demand became greater than the supply, we knew for the first time where we obtained our herbs. Not only Germany, but France, Italy, and the Balkans, supplied us.

One man—"out Ballarat way"—Mr. George Morgan, evidently is one of the few who has not suffered from the prevailing indolence, because for the last thirty years he has been a herb farmer. He has 16 acres under cultivation, which, we believe, is the largest farm of the kind in Australia. This year one firm alone is prepared to take his whole harvest. So here is an opportunity for the woman on the land!

This successful grower informed his interviewer that women could easily make a livelihood with herb-growing. But they must begin in a small way if they want to be successful growers. He suggests 100 cuttings as enough to start with, which can be added to every year. The first year's crop will be probaly small, but the crop will increase every year. June or July are the months for planting in Victoria, and the best aspect is an eastern one. A clay or sandy soil the herbs flourish in, but a moist soil is also good. The land should be twice ploughed, then harrowed, the cuttings then put in fairly far apart, and set in a square formation.

The crop is cut when in flower, which is about November, and the cutting should be done with a hand sickle used close to the ground. Every leaf is used, even the sifting; there is no waste whatever. A hoe, a sickle, flail, and a few baskets are the only necessary requirements.

In taking slips they should always be cut, never broken.

Marjoram, Thyme, and Sage are particularly referred to here, for which there is always a large demand by merchants and butchers. Sage is the most expensive, and as the new leaf is best a fresh supply should be sent out every season.

A very comforting assurance is given that no animal, mice, or rabbits will touch the herbs, nor does any pest molest them. Sheep will carefully graze among the herbs without touching them.

We hope that some of our women readers will be diligent enough to give herb-growing a trial, and shall be glad to hear of their success.—"Weigel's Journal."

GROWING MUSHROOMS.

Growing mushrooms in the open is one of the simplest forms of market-gardening. All that has to be done is to prepare the bed, "spawn" it; and in due course—namely, in Autumn—the mushrooms will appear. Beds should be prepared in time to admit of a crop appearing at the most suitable time. Mushrooms really grow all the year round, and may be gathered in quantities in the Spring season. The spawn is obtained from the parent plant, and much resembles a cobweb. This is preserved in bricks made of a mixture of turf and manure, and will keep for a long time in this condition. At the same time, mushrooms may be produced spontaneously from a bed of manure and earth properly prepared. Without spawn or seed of any kind, if the work is properly done, after a few weeks the mushroom will spring up from a bed of this kind, and will continue to appear for a month or six weeks. The crop, however, exhausts the bed, and preserved spawn must then be introduced.

PREPARING THE BED.

During January or February a quantity of horse droppings should be procured and spread out thinly under a shed till needed. Dig trenches, 1 foot deep and 4 feet wide, and into these throw the droppings to a depth of 9 inches. Ram or tread this down firmly to exclude the air as much as possible, thus preventing the droppings from overheating too much. Now (if spawn is used) break up the spawn bricks into pieces the size of a marble, and set them 1 foot apart, almost on the surface of the manure. If no rain should come, give the beds a fair sprinkling of water, and a few days afterwards cover the manure and spawn with 3 inches of fine soil. As heavy rains frequently occur in February, it is well to provide some shelter for the beds, as too much water is injurious to the spawn. If the weather is suitable, and the temperature of the bed range from 60 to 70 degrees Fahr., within a month or even less, after covering up the spawn with earth, tiny white buttons spring up at intervals all over the bed. These buttons rapidly develop into mushrooms, and in about from ten days to a fortnight are large enough to cut for the market.

RAISING MUSHROOMS WITHOUT SPAWN.

The manure must be well mixed with earth (or earth may be dispensed with) and laid down in a bed about 2 feet high and rammed or trodden down firmly, being slightly watered. In a few weeks the mushrooms will spring from a bed of this kind. A good shelter for it may be made out of half an old galvanised iron tank preferably enclosed with palings to exclude too much light. In France mushrooms are largely grown in tunnels and dark cellars; and when it is necessary to water the beds, the floor and walls are watered, not the bed.

PROTECTING CABBAGES AND RELATED VEGETABLES FROM ATTACKS OF THE CABBAGE ROOT FLY.*

The cabbage root fly is a pest which is widely spread over Europe, the United States, Canada, and other countries. The "Journal of the Board of Agriculture," London, for 17th March last, describes the fly as an ashen grey-coloured insect, not unlike the house-fly in general appearance, and measures about ¼-inch in length. The winter is passed in the pupa stage, and the first brood of flies appears in April or the beginning of May. There are most probably three generations in the year. The eggs are visible to the naked eye, and are laid close to or on the plant, usually just below the surface of the soil. The larvæ are typical fly maggots, of white or pale yellowish colour, and measure about ¼-inch in length when full grown. They commence injury by gnawing the outer layers of the young roots, afterwards making tunnels inside the main root; they may also invade the lower part of the stem. The pupæ are about ⅓-inch long, oval in form, of a light or dark-brown colour, and are found in the soil close to the plants.

As the result of the attacks of the maggots of this insect, growth of the affected plants is checked, the leaves flag and become discoloured, the roots are largely destroyed, and the plants die.

Many remedies have been suggested either for destroying the maggots or for preventing the fly from depositing her eggs near the plants. With very few exceptions, none of the known measures can be recommended as being sufficiently practical and efficient to merit adoption. In a recently-issued article on this insect, Gibson and Treherne† record having experimented with forty-eight different methods of treatment for combating this pest. They conclude, however, with the statement that the only protection to be relied upon in the case of cabbages and cauliflowers is the use of tarred felt paper discs.‡ Professor Goff,§ of Wisconsin, was the first to adopt these discs or protectors, and found them to be thoroughly reliable and practical. His method soon became widely adopted in North America, where the discs have been frequently tested on a large scale, with favourable results. In the British Isles the discs have never received the attention which they undoubtedly merit. Reports on their use are extremely few, and they have not previously been subjected to any exhaustive trials.

During the past season a series of critical experiments has been carried out in several localities, under the writer's direction. The most important trials were those undertaken by Mr. J. T. Wadsworth,‖ Research Assistant in the Department of Agricultural Entomology, Manchester University. These trials were conducted at Northenden (Cheshire) on land which was known to be heavily infested by the root

* The illustrations accompanying the article were from photographs reproduced in the "Journal of the Board of Agriculture" by permission of the editor of "The Annals of Applied Biology."

† "Bulletin 12, Dominion of Canada Dept. of Agric., Entom. Branch, 1916."

‡ These "discs" are really square-cut.

§ "8th Annual Report, Exp. Sta., Univ. of Wisconsin, 1891," pp. 169-173.

‖ For a full account of these experiments, *vide* J. T. Wadsworth, "Annals of Applied Biology," Vol. III., No. 2, 1917.

fly. They were made on both cabbages and cauliflowers grown on well-manured soil. Some 816 cabbages (Leeds Market variety) were planted out on 1st May, and the discs placed in position on the following day. The latter were obtained from America, and are 2½ inches square. Each is provided with a slit extending to a point ½-inch beyond the centre of the disc, and a shorter slit crosses it at right angles in the centre of the disc (Fig. 1).

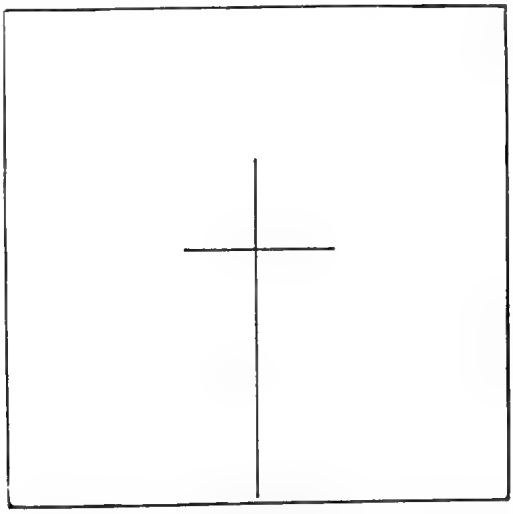

FIG. 1.—OUTLINE FIGURE OF A DISC; ACTUAL SIZE.

In order to obtain good results, it is desirable that the soil should be in a friable condition to enable the discs to be placed quite flat on the ground. They must be placed round the stems of the plants as soon as possible after the latter are planted out in the field (Fig. 2). Failure

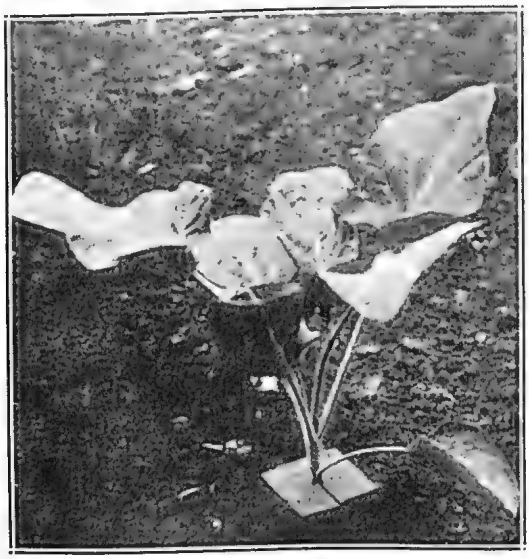

FIG. 2.—PHOTOGRAPH OF A BRUSSELS SPROUT PLANT SHOWING DISC IN POSITION.

to take this precaution often results in the plants becoming infested prior to the discs being applied, and the value of the latter is then lost. In the case of vegetables planted out earlier than May, this precaution is not so urgent, but the date of appearance of the flies varies according to the prevailing climatic conditions, and the location of the particular district concerned.

The main function of the disc is to act as a mechanical device to prevent the flies from laying their eggs in the usual position, close round the plants. It is, furthermore, important to keep the surface of the discs free from soil; otherwise the insect will deposit its eggs thereon, and the young maggots will readily gain access to the protected plants. Of the 816 plants used in Mr. Wadsworth's experiments, half were provided with the discs, and the remainder left unprotected. Only one plant was lost out of the 408 protected plants, while 54 of the untreated cabbages were severely attacked. With regard to cauliflowers, the results were even more striking; 932 plants were utilised, and, similarly, half of these were protected and the remainder left unshielded as controls. Only 24 of the protected plants were lost as compared with 294 of the unprotected plants.

In addition to experiments by Mr. Wadsworth, three market-gardeners undertook small scale trials. Full instructions were given in each case as to the method of application and the use of the discs. One grower, at Chorlton-cum-Hardy (near Manchester), who was supplied with 100 of the discs, reported that no case of root-maggot attack was noted where they were used, and that so far as his observation went they were successful. Another grower, at Prestwich (Cheshire), wrote that he had applied the discs to 50 cabbages, and, out of those, only 2 were attacked. Of 50 control plants most were infested. The third observer (at Nottingham) applied 100 of the discs, and reported that out of 84 protected cauliflowers only 5 were apparently attacked, and none were lost. Of 20 unprotected plants, 12 survived. He also experimented with 36 Brussels sprouts, 6 of which were provided with the discs. These all produced strong healthy plants, while all the unprotected ones were affected, 5 being completely destroyed.

Growers of cauliflowers and related vegetables are strongly advised to give these discs a fair trial. Their application is extremely simple, and can, if necessary, be undertaken by children. If they are placed carefully on the plants, no further attention, as a rule, is necessary. Once the plants have made good growth they have been tided over the most vulnerable period, and the soil can be earthed up over the discs, as the latter are then no longer necessary. The use of the discs is not the only measure advisable. The custom of cutting the vegetables and leaving the stumps to decay should be discontinued. The plants should be uprooted straight away in infested lands, as their stumps only serve as breeding places for fresh broods of maggots.

Arrangements have been made for the discs to be manufactured and sold at 1s. per 100, or 8s. per 1,000. The address of the maker may be obtained on application to The Secretary, Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	2	6	Ayrshire Herd Book of Queensland
		2	3	Holstein-Friesian Herd Book of Australia
		3	13	Jersey Herd Book of Queensland
J W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Frisian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Frisian Herd Book of Queensland
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH APRIL TO 26TH MAY, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Margaret	Ayrshire	14 Sept., 1916	684	4·8	38·71	
Cocoatina ...	Jersey	6 Mar. 1917	589	4·8	33·33	
Lady Melb.	Holstein	14 Feb., ,,	801	3·4	31·82	
Miss Edition	Jersey	25 Dec., 1916	547	4·8	30·96	
Violette's Peer's Girl	,, ...	13 Dec. ,,	433	6·0	30·77	
Twylish's Maid	,, ...	2 Nov. ,,	343	7·2	29·35	
Comedienne	,, ...	24 Nov. ,,	373	6·3	27·84	
Hedges Madge	Holstein	22 Mar., 1917	657	3·6	27·70	
La Hurette Hope	Jersey	6 Oct., 1916	236	6·3	27·61	
Miss Betty	,, ...	27 Mar., 1917	613	3·8	27·31	
Thornton Fairetta	,, ...	26 May, 1916	312	7·2	26·70	
Glade ...	Shorthorn... ...	29 Mar., 1917	645	3·4	25·62	
Iron Plate ...	Jersey	9 Dec., 1916	444	5·1	25·53	
Lady Spec...	Ayrshire	17 Jan., 1917	548	3·9	25·07	
Sylvia II. ...	Shorthorn... ...	16 Jan. ,,	570	3·6	24·05	
Lady Doris	Ayrshire	2 April ,,	521	3·8	23·22	
Jeannie ...	,, ...	27 Oct., 1916	426	4·6	23·08	
Lady Annette	,, ...	11 Nov. ,,	406	4·8	22·97	
Glen ..	Shorthorn... ...	18 Jan., 1917	435	4·4	22·52	
Constancy ...	Ayrshire	27 Dec., 1916	458	4·0	21·50	
Miss Security	Jersey	27 Mar., 1917	573	3·2	21·39	
Miss Bell ...	,, ...	1 Aug., 1916	272	6·6	21·29	
Hedges Dutchmaid	Holstein	22 Aug. ,,	406	4·4	21·03	
Belinda ..	Ayrshire	23 Feb., 1917	525	3·4	20·86	

A clerical error was made in last month's report; the cow giving the highest yield was Lady Margaret, not Lady Dorset, as stated.

The cows were grazed on natural pastures supplemented by a ration of maize silage mixed with wheaten chaff.

NATIONAL HERBARIUM MELBOURNE OF VICTORIA

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1917.

The total number of eggs laid during the month was 4,193. Twenty pens have two or more birds moulting. The health of the competitors generally has been good. C. Porter had the misfortune to lose one of his pullets with ovary trouble. Westerly winds and cold nights during the early part of the month threw some pens back, but, should the present warm days continue, they should speedily come round again. Mr. E. Chester again wins the monthly prize in the light breeds; while Mr. Claussen scores in the heavies. The following are the individual records:—

Competitors.	Breed.	May.	Total.
LIGHT BREEDS.			
E. Chester	White Leghorns	121	239
W. Becker	Do.	119	210
G. Chester	Do.	91	195
W. Crust	Do.	83	187
Oaklands Poultry Farm	Do.	109	184
A. H. Padman, S.A.	Do.	80	177
*G. H. Turner	Do.	104	176
T. R. Hawkins	Do.	86	172
T. A. Pettigrove, Victoria	Do.	106	170
*J. R. Wilson	Do.	60	168
T. Taylor	Do.	83	162
*J. Zahl	Do.	90	162
*A. W. Bailey	Do.	82	157
R. Holmes	Do.	74	150
F. W. Leney	Do.	105	149
Mars Poultry Farm	Do.	78	147
C. Porter	Do.	69	141
C. Knoblauch	Do.	89	133
J. G. Richter	Do.	63	126
*A. T. Coomber	Do.	76	126
E. Cross	Do.	45	121
*Mrs. J. D. Munro	Do.	87	117
Moritz Bros., S.A.	Do.	94	110
G. Williams	Do.	51	109
Mrs. W. D. Bradburne, N.S.W.	Do.	40	107
D. Fulton	Do.	39	107
*Dixie Egg Plant	Do.	88	100
C. H. Singer	Do.	38	97

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	May.	Total.
LIGHT BREEDS—*continued.*			
F. Clayton, N.S.W.	Do.	58	96
A. Shillig	Do.	35	95
Mrs. J. Carrutl ers	Do.	32	91
Mrs. S. J. Sear	Do.	24	89
Quinn's Post Poultry Farm	Do.	33	87
Kelvin Poultry Farm	Do.	70	87
*T. Fanning	Do.	28	85
*J. M. Manson	Do.	71	76
Miss M. Hinze	Do.	60	73
L. G. Innes	Do.	34	71
*G. C. Dennis	Do.	65	66
J. L. Newton	Do.	35	65
C. P. Buchanan	Do.	28	60
E. A. Smith	Do.	33	56
J. Holmes	Do.	33	52
J. Ferguson	Do.	35	44
*Dr. E C. Jennings	Do.	31	43
S. C. Chapman	Black Orpingtons	22	38
G. Howard	White Leghorns	34	34
G. J. White	Do.	27	33
*A. E. Walters	Do.	30	30
HEAVY BREEDS.			
F. A. Claussen	Rhode Island Reds	101	177
*R. Burns	Black Orpingtons	91	167
W. Smith	Do.	79	159
A. E. Walters	Do.	77	158
H. Jobling, N.S.W.	Do.	68	140
*Mars Poultry Farm	Do.	81	135
D. Kenway, N.S.W.	Do.	57	131
W. G. Hanson, N.S.W.	Do.	77	116
Cowan Bros., N.S.W.	Do.	60	100
F. Clayton, N.S.W.	Rhode Island Reds	80	94
P. C. McDonnell, N.S.W.	Black Orpingtons	58	91
Mrs. J. H. Jobling, N.S.W.	Do.	45	71
*Oaklands Poultry Farm	Do.	39	64
*C. F. Dennis	Do.	56	56
*Kelvin Poultry Farm	Plymouth Rocks	34	42
King and Watson, N.S.W.	Black Orpingtons	32	38
*F. W. Leney	Rhode Island Reds	28	38
C. R. Bertelsmeier, S.A.	Black Orpingtons	21	32
C. C. Dennis	White Wyandottes	24	24
E. Morris	Black Orpingtons	0	13
*E. A. Smith	Do.	10	11
J. M. Manson	Do.	11	11
R. Burns	S. L. Wyandottes	3	3
*Miss M. Hinze	Black Orpingtons	1	1
Totals		4,193	7,432

* Indicates that the pen is engaged in the single hen test.

RETURNS FROM SINGLE HEN TEST.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
G. H. Turner	9	31	37	34	29	36	176
J. R. Wilson	30	28	22	33	39	16	168
J. Zahl	31	21	40	14	36	20	162
A. W. Bailey	32	7	31	28	28	31	157
A. T. Coomber	26	4	29	27	10	30	126
Mrs. Munro	41	26	18	7	0	25	117
Dixie Egg Plant	18	14	19	31	18	0	100
T. Fanning	6	28	13	15	4	19	85
J. M. Manson	15	7	9	5	13	27	76
C. C. Dennis	12	5	0	14	15	20	66
Dr. Jennings	0	0	2	7	26	8	43
A. E. Walters	0	1	1	12	16	0	30
HEAVY BREEDS.							
R. Burns	20	0	38	8	47	54	167
Mars Poultry Farm	27	37	13	37	11	10	135
Oaklands Poultry Farm... ...	28	0	0	0	36	0	64
C. F. Dennis	1	0	31	18	16	0	56
Kelvin Poultry Farm	14	0	0	28	0	0	42
F. W. Leney	0	0	0	0	26	12	38
E. A. Smith	1	0	0	10	0	0	11
Miss H. Hinze	0	0	0	1	0	0	1

POULTRY FLOOR SPACE.

For Leghorns, the allowance for floor space is generally 4 square feet. A house 10 feet square has a superficial floor space of 100 square feet. This will be sufficient for 25 hens. Less space is not allowable, because the active Leghorns require quite as much space as the larger breeds.

The Orchard.

SUBSOILING THE ORCHARD BY EXPLOSIVES.

The value of explosives in preparing land for fruit-tree planting as well as for renovating a neglected orchard has frequently been demonstrated in practice in Queensland, and during the past month we have seen the effect of dynamite charges in getting land ready for tree planting within a few miles of Brisbane. With a single plug of dynamite placed at a depth of 15 inches in a hole made by an iron bar, the subsoil was shattered to a depth of nearly 3 feetand laterally to 4 or 5 feet. The following paper, written on the subject by G. N. Hyam for the "New shattered to a depth of nearly 3 feet and laterally to 4 or 5 feet. The Zealand Farmer, Stock, and Station Journal" (May, 1917), deserves to be carefully studied by orchardists in this State:—

"Subsoiling by explosives is," as Mr. Hyam says, "a principle sound in theory and effective in practice."

"The principle of subsoiling, or trenching, is probably the first axiom of farming and horticulture. It was practised by the Romans, and is advocated by all those quaint writers on the 'Arte of Husbandrie' whose books are a source of enjoyment to all modern agriculturists and

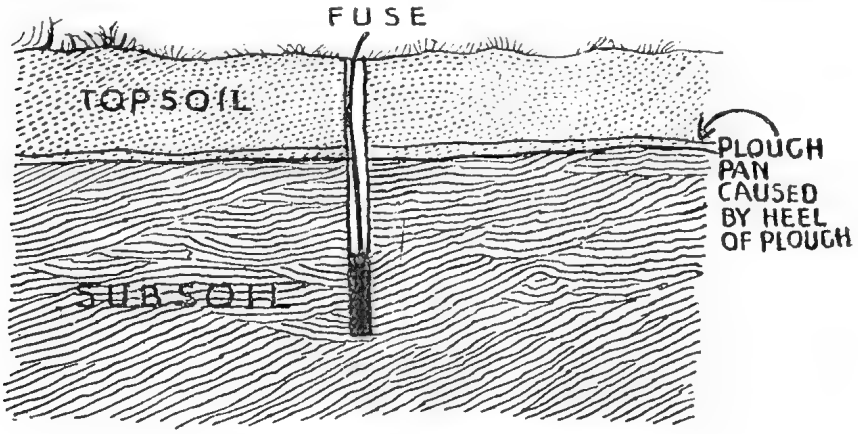

FIG. 1.—METHOD OF INSERTING CHARGE IN NORMAL LAND.

horticulturists who read them. In France the modern vignerons, following the practice of centuries, seldom, if ever, plant their vines without deeply trenching, in spite of the heavy cost of spade cultivation. In the new countries the cost of trenching, or even of subsoiling with the subsoil plough, is almost prohibitive, although the benefits of deep stirring of the soil are generally admitted. The use of explosives for this stirring, although not quite so effective as thorough trenching with

the spade, is a cheap and speedy method which is more efficient than some subsoil ploughs, owing to the fact that the latter only breaks the soil to a depth of about 18 inches, and, furthermore, it leaves a hard layer immediately under the plough sole. The cost of subsoiling with the plough is also almost beyond the average orchardist on account of the

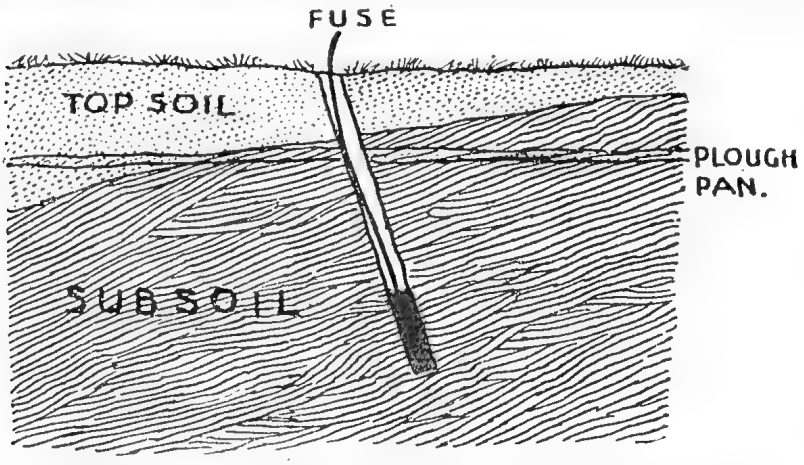

FIG. 2.—METHOD OF INSERTING CHARGE WHERE THE STRATA SHOWS AN INCLINATION, I.E., AT RIGHT ANGLES TO THE DRIFT OF THE SUBSOIL.

heavy draught required, whilst the cost of explosives for the same work is within the reach of everyone. In this article it is only intended to deal with the question from the point of view of the orchardist, but it is equally applicable to agriculture, particularly in the cultivation of root crops, maize, lucerne, and all deep-rooting crops. Too little attention is often given to the preparation of the soil prior to planting an orchard; a

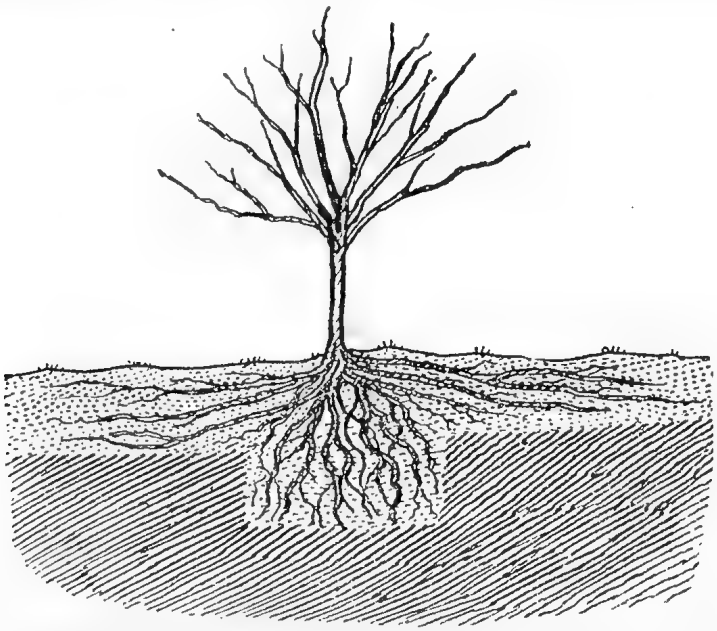

FIG. 3.—ROOT SYSTEM OF YOUNG TREE IN A SPADE-DUG HOLE, SHOWING TENDENCY TO RUN PARALLEL TO SURFACE.

hole is hurriedly dug in roughly ploughed ground, and no care is taken to develop a strong root system. The grower will often take particular care of the shaping of his tree and the after cultivation, without paying any attention to the root system which has as much or more effect on the development and fruiting of the tree as anything that can be done above ground. The fruit tree is common with all plants, is dependent for its growth and vigour on the supplies of water and mineral contents of the soil which its roots extract from both the top soil and the subsoil. No amount of surface manuring or cultivation will compensate for the immense supplies available in the subsoil, and to get full results from the tree as a crop producer we must promote a vigorous growth of those fibrous roots which are the main feeders. These roots are prone to follow the lines of least resistance; and if they strike hard ground such as is caused by the plough sole, or even the walls of a spade-dug hole, they will inevitably travel in a horizontal direction, instead of striking into the subsoil and making available those supplies of mineral food and moisture that are stored therein.

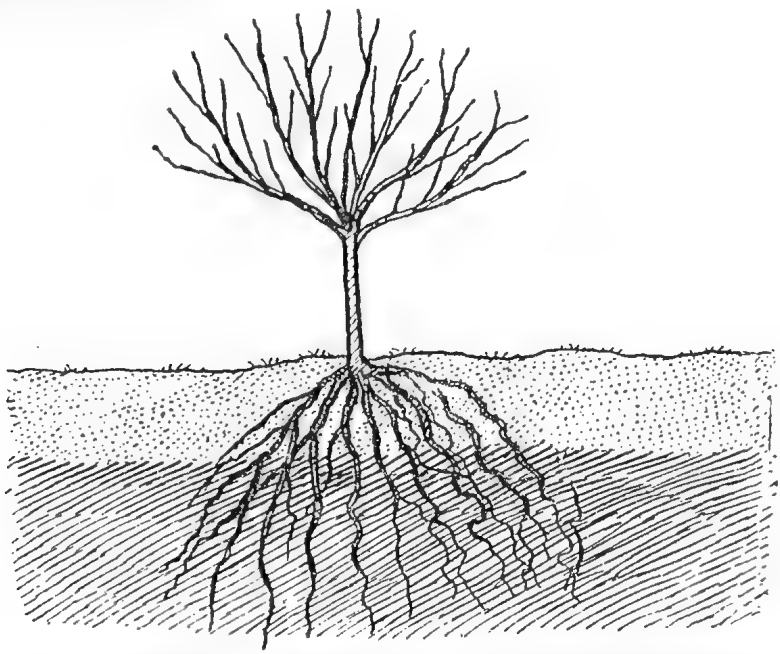

FIG. 4.—ROOT SYSTEM OF TREE PLANTED IN SUBSOILED OR TRENCHED LAND.

"A shallow spade-dug hole has the effect of forming a sump or drain for the surrounding soil, particularly where the land has a clay subsoil, and a tree with ' wet feet ' is a prey to all fungus diseases. The use of explosives for tree-planting, when carefully carried out with the proper charges, entirely obviates this danger. All the large explosives manufacturers now make a special farmer's explosive, with carefully graduated charges, which are designed to give best results in subsoiling, and which are safer to handle than ordinary dynamite or gelignite. They are almost as safe as an ordinary gun cartrideg until the detonator is fixed; some of them being non-explosive until they are immersed in a special liquid just

before laying, and the whole operation can be conducted by anyone of ordinary intelligence if he studies the local soil conditions.

"The system which the writer has successfully adopted is a simple one. An ordinary 2-inch auger is used, with the shaft lengthened to 6 feet in detachable sections of 2 feet, any blacksmith being able to make this alteration. I then make several trial bores, for the full length of the auger, to ascertain the nature of the subsoil by carefully watching the earth brought up. It is also advisable to notice whether the different strata or layers of soil show any inclination, as it gives better results by placing the charge at right angles to the strata. All the manufacturers issue comprehensive instructions, giving the methods of attaching the fuse, the amount required of their respective brands for various soils, &c.; but it may be noted here that clay soils require the deepest bores and heaviest charges, sandy and alluvial type the shallowest holes and the lightest charges. I have found that in my experience the best results are obtained by boring three holes at the points of an equilateral triangle whose sides have a length of 4 feet; the triangle to have the proposed site of the tree in the centre. These holes are bored with the auger from 2 to 4 feet in depth, according to the nature of the ground, and a half, three-quarter, or full plug, with detonator and fuse attached according to manufacturer's directions, inserted. The charge should be well tamped down with a wooden rod—a metal rod is dangerous—and fired.

"A successful blast should show a gentle uplift of the ground, and it should be possible to insert an iron rod anywhere in the radius of the blast, to a depth of 5 or 6 feet, by a simple pressure of the hand. If a crater has formed, the charge has been too heavy or the bore too shallow;

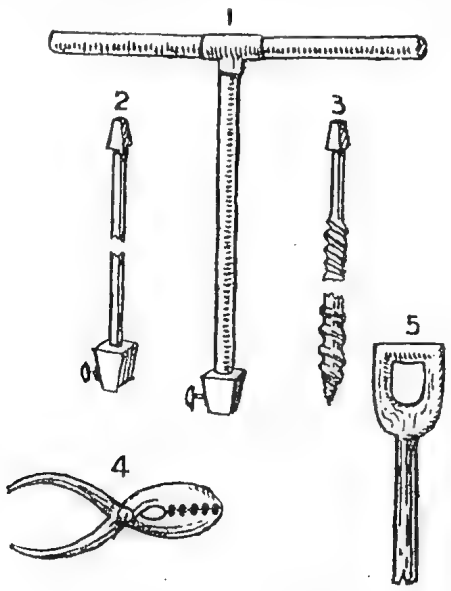

FIG. 5.—TOOLS REQUIRED.

(1) Auger handle. (2) Auger extension. (3) Auger 2 in. in diameter. (4) Gasfitter's plyers, for crimping detonators onto fuse. (5) Wooden tamping rod, 3 ft. long and 2 in. thick.

the soil removed should be carefully replaced and stamped down, as otherwise cavities will have been formed which will be a catchment or sump for water.

"In the case of clay soils the clay rarely extends more than 6 feet, and the charge should be inserted at a point three-quarters of its extent; the blast will then render the whole quite porous. In gravelly soils the charge should be fired at about 2 feet from the surface, whilst in sandy or alluvial soils it should be placed just under the "hard-pan" which is nearly always present.

"Subsoiling by explosives may easily be carried out on an established orchard by placing slightly heavier charges in a triangular position, the sides of which should have a length equal to the diameter of the circle covered by its outside limbs. If any of the trees in your orchard are making poor growth, or are not so vigorous as their neighbours, and seem to be particularly susceptible to fungus diseases—such as black spot, ripe rot, &c.—blasting will probably restore them to normal, for in nine cases out of ten 'wet feet' is the cause. It frequently happens that there is a thin strata of clay under such trees that is preventing effective drainage. The effect of subsoiling on the growth of young stock is surprising; and it is an interesting experiment to lift two young trees—one from blasted ground and another one from a spade-dug hole—to compare the root system. In the first case the fibrous roots will have gone down almost perpendicular, whilst in the latter they will be horizontal.

"The best time of the year to do this work is in the early autumn where the trees are to be planted the following winter; and the best results are obtained when carried out after a dry spell, damp soil being rather resistant to the effects of the discharge, with the result that the ground is not broken up into the fine particles that are desirable to allow the nitrogenous bacteria to have the air and moisture they require to carry on their beneficent work.

"Growers of citrus fruits, particularly lemons, will find that they will derive special benefit from subsoiling by this means. The lemon is supposed to be a surface-rooting tree, but some years ago I tried planting them in blasted ground, with the result that their development was very fast. These trees always had a good deep green colour on the leaves, which proved that they had found good stores of nitrogen, and that the nitrogenous bacteria had been active through the thorough aeration of the soil. We also found that the so-called surface roots had taken a downward course, and I now believe that these roots are only compelled to come towards the surface where supplies of nitrogen are lacking."

ROOT SYSTEM OF FRUIT TREES.

In reply to a request by a fruit-grower at Proserpine for some information on the above subject, Mr. C. Ross, Instructor in Fruit Culture, says:—"Long experience in Queensland has taught us that a deep-rooted system for citrus and many other fruit trees gives the best

results, and surface roots should be discouraged by continuous cultivation. Surface roots are too susceptible to every climatic change. During light continuous rain, a mass of small surface roots is produced, which die off during drought and are apt to encourage root fungus; they also cause a growth of small twiggy, useless shoots; whereas the roots in the cooler strata, with a more equitable temperature, produce a steady growth of robust, well-ripened wood which soon hardens off into a good bearing habit. The surface soil should be kept in the state of a soil mulch by continual scarifying. Deep tap roots (like those of pear trees) penetrating deep into an uncongenial subsoil should be pruned off."

REMARKABLE GROWTH OF A BANANA TREE.

A correspondent writes to the "Agricultural News," Barbados, from Antigua to say that he has observed a banana tree exhibiting unusual features of development. The tree to which reference is made, after it had borne a large bunch of bananas, was cut down, as usual, leaving about 12 to 14 inches of stump, around which were several suckers. Instead of the stump withering, as is usual, it commenced a fresh growth from the centre, as occurs in the case of young trees that have not borne. This shoot rapidly developed, sending out leaves, and finally grew to be a second tree, while the suckers all withered and died. The growth of the tree did not end there. After being manured, and the soil having been forked, the plant sent up two new suckers, and a second bunch of fruit has been put out, not coming up as usual out from the side, but it has shot up vigorously, as if from the heart of the tree, almost perpendicularly at first, though later its weight has inclined it so that it rests supported on the apparently abnormal growth of leaves. The editor of the "News" says that a similar case was recently noticed in a garden in Barbados. The growth described is, of course, abnormal; and it is difficult to assign any definite cause to the event.

RECKONING AMOUNT OF HAY.

A subscriber wants to know how to estimate the amount of hay in a stack. Four hundred cubic feet of hay is roughly estimated as a ton, but there is great variation in the weights of hays compared with volumes. These variations are dependent upon the kind of hay, time of cutting, and treatment in storing.

To estimate the measurement, multiply the length, width, and height of stack together. For example, if the stack is 40 ft. long, 16 ft. wide, and 18 ft. from the bottom to the top, the stack will contain 40 x 16 x 18, or 11,520 cubic feet; 11,520 cubic feet divided by 400 gives 28·8 tons.

Viticulture.

THE ALCOHOLISATION OF WINES.

By C. A. GATTINO.

(1.) Is the addition of alcohol necessary?

(2.) If so, is it detrimental to the hygiene?

(3.) In the affirmative case, when and how has it to be done?

(4.) Is the alcoholisation the best and only corrective for rendering conservable weak and defective wines?

These are questions worth while examining as an enlightenment to the wine-grower and the consumer, and as a guide to our competent authorities in the formation of Acts relating to the wine industry.

My replies are the following:—

In Pro.

For nearly all wines derived from diseased grapes, an addition of spirit is adapted; but same will have to be made with certain rules, which I will explain later on.

These ill-made wines are of difficult conservation, because they are deficient in alcohol; whilst they contain excessive quantities of azotate matter and very probably special ferments not yet studied. For the said reason these kinds of wines are easy alterable and require more often topping up and sulphurating. But if these precautions are efficient for the conservation of the wines, they are not effective for improving its quality. An adequate addition of good alcohol would certainly assure the conservation of the said badly-made wine, and make it tastier and more hygienic. In saying "more hygienic," I want to make several distinctions. The alcohol we find in the trade is generally detrimental to health; and it is only by the careful choice of the spirit required for fortifying, and by the adequate dosage, that we can prevent laws completely prohibiting the use of the alcohol in the preparation of spirituous beverages. The more ethylic alcohol is contained in the spirit, so much more hygienic is the latter. The spirit extracted from the wine, well rectified and purified, is the only one which contains practically all ethylic alcohol, and is therefore the most hygienic and the most appropriated for fortifying wines.

On the other hand, the spirit of potatoes—which contains amylic alcohol—and the spirit of beetroot or grains (cereals)—which contain propylic, butylic, and amylic alcohol—are more or less hurtful according to their degree of rectification.

The following preferential order has to be given to the well-purified spirits offered by the trade:—(1) Spirit of wine; (2) spirit of grape residues; (3) spirit of beetroot; (4) spirit of grain; and (5) spirit of potatoes.

I will exclude from the choice the spirit of grape residues, which, although well rectified, will always give to the wine a certain taste of "schnapps," and also the alcohol of potatoes, which has injurious effects on the human organism and has never a neutral taste or smell.

We, therefore, have only these three to choose from:—Spirit of wine of at least 48 per cent. o.p.; spirit of grain of at least 66 per cent. o.p.; and spirit of beetroot of at least 66 per cent. o.p.

These spirits, added to the wine in proper and in adequate quantity, can be considered as not hurtful; and the wines so fortified can be considered more hygienic and conservable than the natural wines produced from diseased grapes.

The Academie De Medicine of Paris—in the congress held in 1886—resolved that the alcoholisation of weak natural wines marking not more than 18 degrees Sykes (or 10 parts per centum of alcohol) can be tolerated from the health point of view if the alcoholisation is made of pure spirit and in quantity not above 2 per cent. And the same can be applied to the above-mentioned ill-made wines. Let us see when and how the alcoholisation should be made:—

When?—I would do same when the wine has to be racked off. The wine, during the Winter having formed sedimentations, needs to be taken away from the dreggy deposit before the warm temperature of the Spring starts. Make ready first the casks into which the clear wine has to be transferred, and pour into the bottom of the cask the necessary quantity of spirit required for the alcoholisation. Then rack off the wine, slowly pouring the latter above the spirit so as to obtain an intimate mixture.

How?—I have already told. By pouring the spirit into the cask before the wine. The dosage depends on the natural alcoholic degree of the wine to fortify; it is, therefore, not possible for me to tell you now the quantity of spirit that should be used. What, however, I will point out is that weak wines do not allow of a too high alcoholisation. The wine would lose all equilibre, acquiring a peculiar burning taste, caused by the disproportion between the wine substances and the spirit.

As I stated, this alcoholisation could be tolerated at the proportion of 2 per cent., and only when the wine resulted unexpectedly weak and ill, independent of the willingness of the wine-maker.

In Contra.

By my article on "The Viticulture and Wine Industry after the War," which appeared in the May issue of the Journal, you could see that I do not like the alcoholisation of wines, and I advised the competent authorities to prevent such alcoholisation as much as possible.

The spirit, not being able to completely incorporate itself into the wine, as soon as it enters into the stomach of the consumer, evaporates, throwing its fumes up to the head, thus producing the sad consequence of drunkenness.

By restrictive legislation in the sale and use of spirits (*i.e.*, State Monopoly), we would attain an increase in wine consumption and a

decrease of the reasons giving existence to the abstinence societies. Legislation should, therefore, facilitate the "sugaring" of the "must" (grape juice) only before or during its fermentation, which practice would attain the same end of the alcoholisation without entailing the same bad consequences. Owing to the special conditions of the sugar industry in the State, this practice would be of great benefit to Queensland, and we would keep the money in our State, instead of buying spirits from other States or abroad, as is actually done. Certainly adequate laws should regulate the use and the permits for sugaring the must for those localities where unfavourable seasons have affected the soundness of the crop.

In any case, the wine-maker has, before all, the very natural way of raising the strength of weak wines, which is:—The blending of the weaker wine with a stronger one.

Especially here in this country, where there is such a great variety of climate, soil, and altitudes able to produce wines with a natural alcoholic title varying from 20 degrees to 30 degrees Sykes, the wine-maker should not need to raise the strength of the wine with the spirit; but in case it should do so, owing to exceptional bad conditions of the season, then the "*sugaring of the must*" is the next best practice.

The addition of sugar to the sour *must*, derived from unripened or ill-grapes, is also a real necessity; and the sugar to be preferred for this addition is just the sugar of cane.

My conclusive opinion about the alcoholisation of wines is that all wines which were fortified with spirit should be sold as such, whether as draught or in bottles. I consider that the public consumer has the right to know what sort of wine he is getting—either the natural wine or the one fortified with spirit.

And, again, the sale of wines fortified with spirit, offered to the consumer under the same classification of the natural wines, is an injustice to the public consumer, to the small wine-grower, and is detrimental to the progress of the wine industry.

AN AUTOMATIC FROST KILLER.

"Popular Mechanics" describes the invention of a simple thermostatic controlling device. A Los Angeles man has developed an ingenious apparatus for rendering the smudge pots used by orchardists self-operating. The appliance, which may be fitted to any standard type of pot, is regulated by a small copper rod. When the atmospheric temperature drops to a predetermined point, the contraction of the rod is sufficiently great to release a cup containing an acid. The liquid is poured into a small chamber provided in the smudge pot. This holds a chemical substance which burns upon the addition of the acid, producing a flame that ignites the crude oil used in the pot. The thermostat may be adjusted so as to release the acid when the temperature falls to any specific degree. With this apparatus in use, an orchard may be protected from frost without personal attention being given it. The pots are placed beneath the trees and brought into use automatically when they are needed instead of having to be lighted by hand.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND

By C. T. WHITE, Acting Government Botanist.

No. 9.

On the Species of Datura (Thorn Apple) Naturalised in Queensland.

"STRAMONIUM" OR "COMMON THORN APPLE" (*Datura Stramonium, Linn.*).

Description.—A coarse, ill-scented weed of annual duration. Stems pale green. Leaves irregularly cut and toothed, dark green above, paler beneath, on short leaf-stalks. Flowers white, trumpet-shaped, solitary in the forks of the branches. Capsule ovoid, prickly, opening at the top when mature into several valves (usually four). Seeds numerous, dark brown or blackish, flat and wrinkled.

A very common weed of waste places and of cultivation almost throughout the State. It is more commonly known in Queensland as "Stramonium."

It is widely spread over the whole world, with the exception of the colder, temperate regions. Like many other widely-distributed plants, its country of origin is doubtful. In America it goes under the name of "Jimson Weed."

Properties, Uses, &c.—The whole plant is poisonous. It is, however, usually left untouched by all classes of stock. Drying does not destroy the toxicity, and in the United States it is recorded that cattle have been poisoned by eating the young leaves dried in hay. There are cases on record of children having been poisoned through eating the seeds and putting the flowers in their mouths. In South Africa the seeds are said to be fatal to young ostriches. Both seeds and leaves are used medicinally. In a long account of the medicinal properties of *Datura*, Bentley and Trimen state—"In asthma, catarrhs, and other cases the dried leaves are smoked like tobacco, or inhalation from their infusion in hot water is resorted to. But its use in these directions requires caution, as it has proved highly injurious and in some instances fatal. In the form of ointment, fomentations, &c., the leaves and seeds of different species of *Datura* have been found useful in allaying pain, &c. Locally applied to the eye, *Stramonium* produces dilatation of the pupil."

PURPLE THORN APPLE (*Datura Tatula*, Linn.).

This principally differs from *Datura Stramonium* in its flowers being of a purple or lavender colour paling to white in the throat. The stems, leaf-stalks, principal veins of the leaves, and capsules are all of a deep purple, not pale green as in *D. Stramonium*, of which by many it is regarded—perhaps correctly so—as a variety. For the sake of

PLATE 1.—DATURA TATULA (PURPLE THORN APPLE).
The common form (D. Stramonium) mainly differs from this in having pale green stems and white flowers.

PLATE 2.—DATURA FEROX.
A "Thorn Apple" new to Queensland.

convenience it is here recorded as a separate species. It is not quite so common in Queensland as *D. Stramonium*. Its range, properties, uses, &c., are the same.

A "THORN APPLE" NEW TO QUEENSLAND (*Datura ferox*, Linn.)

Description.—An ill-smelling, coarse, annual weed. The young shoots pubescent. Stems pale-green, puberulous. Leaves coarsely toothed, beset with a few scattered hairs. Flowers white, solitary in the forks of the branches. Capsule puberulous, covered with long, large spines.

Specimens of this week were collected at Macalister, Western Darling Downs, by Mr. E. W. Bick a little over a year ago, who stated that it was the common species in that district; it was then determined as *D. ferox*, but, having little information about the plant in the literature available here, specimens were sent to the Royal Botanic Gardens, Kew, England, and the identification confirmed. Mr. E. Kenny, Macalister, to whom we are indebted for the specimen here figured, states (May, 1917):—"The council men call it 'Stramonium,' and have pulled and cut it nearly all out, and the cold weather has settled the rest for this season." The local name is apt to cause confusion with the commoner species.

Properties, Uses, &c.—The whole plant, like others of the genus, is poisonous. It no doubt possesses properties similar to if not identical with *D. Stramonium*.

Country of Origin.—I cannot at all say how the plant came here. According to Engler and Prantl ("Die Naturlichen Pflanzenfamilien") and to Koorders ("Excursionsflora von Java"), the species is native to Spain and Sicily. The "Index Kewensis" and other works give it as a native of China. Forbes and Hemsley ("Index Florae Sinensis") state:—"*Datura Metel* and *D. ferox*, both widely spread plants, are recorded as occurring in China." We must leave it at that for the present.

HAIRY THORN APPLE (*Datura Metel*, Linn.).

A tall undershrub. Stems stout, much-branched, finely glandular-hairy. Leaves softly hairy, entire or toothed, often wavy edged. Flowers white, large, trumpet-shaped. Calyx tubular, glandular-hairy. Capsule, pubescent, globular, large (about 2 inches diameter), reflexed (nodding), prickly.

A native of Tropical America; a common weed of roadsides and waste-places about towns in Queensland.

A poisonous plant, like the preceding species.

Datura fastuosa is recorded as naturalised in Queensland; all the specimens I have seen so labelled, however, belong to *D. Metel*.

A native species (*Datura Leichhardtii*) is common in some Western and Northern localities.

Eradication.—Hand-pulling or hoeing up before the plants bear ripe fruit is about the only certain method of dealing with these weeds.

PLATE 3.—DATURA METEL.
"Hairy Thorn Apple."

A PLANT POISONOUS TO STOCK.

Dr. J. Shirley, Principal of the Teachers' Training College, Brisbane, in a letter to the Editor of the "Queensland Agricultural Journal," draws attention to a yellow-flowering climbing plant known locally as the Cape Ivy. It has no connection with the Ivy family, but is a climbing relation to the well-known English groundsel. Its true name is *Senecio latifolius*. At the present moment the Brisbane suburbs have their gardens gay with its coloured flowers. From the Presidential Address by Dr. R. Marloth, delivered at Cape Town on 30th May, 1914, and published at Cape Town by the Cape Chemical Society, Dr. Shirley quotes the following extract:—"*Senecio latifolius* (Molteno disease plant) contains two alkaloids—viz., senecifoline and senecifolidine. The alkaloids produce hepatic cirrhosis, and must be considered to be the cause of the deleterious action of the herb."

From the above it is seen that the plant is the cause of a stock disease, producing a fibrous condition of the liver, and a change to a yellowish colour, followed by atrophy and death.

The plant was brought from the Cape by members of contingents returning from the Boer War. "It is being planted widely all over Queensland," says Dr. Shirley, "and as its tiny fruits, usually regarded as seeds, are scattered like thistledown by the winds, we shall have it widely and firmly established."

It is to be hoped that those who have planted this pernicious weed will give heed to Dr. Shirley's timely warning, and promptly eradicate it.

[Mr. C. T. White, Acting Government Botanist, referring to this plant, says that "the Cape Ivy is not *Senecio latifolius*. The poison herb *S. latifolius* of South Africa is quite a distinct plant. I look upon the Cape Ivy as *S. tamoides*."—Ed. "Q.A.J."]

CROP ROTATION: EFFECT ON FERTILITY.

Some remarkable figures showing the importance of rotation (says the "Producers' Review") are given by Professor C. A. Gearhart, of the Ohio Experiment Station. In a twenty-year test with corn the following results were obtained, average yields per acre during the first years being compared with average yields during the fourth five-year period, and then the average for twenty years being given.

Average corn yield per acre in bushels:—

	First Five Years.	Fourth Five Years.	Average for Twenty Years.
Continuous—no manure ..	26·26 ..	8·44 ..	15·47
Rotation—no manure ..	31·89 ..	20·31 ..	28·95
Continuous—with manure ..	43·13 ..	30·22 ..	37·02
Rotation—with manure ..	40·73 ..	55·83 ..	51·81

Even with manure it will be seen the yields in fields continuously cultivated in corn decreased 13 bushels per acre (comparing the fourth five-year period with the first five-year period), while rotation with the manured fields increased the yields more than 15 bushels per acre.

Entomology.

THE CANE BEETLE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from Mr. Jarvis, the Entomologist:—

Grubs of the greyback cane beetle are now in the third stage, fully grown, and about to pupate.

Greenhills Plantation, near Gordonvale, is reported to be suffering severely this season, 300 acres or more being badly affected; and the pest is also doing great damage in the Highleigh and Aloomba districts.

Whilst ploughing cane land during April and May one frequently turns up numbers of small grubs about three-quarters of an inch long, which, occurring in association with third-stage *albohirta* 1¾ inches in length, are erroneously believed by most cane-farmers to be young larvæ of this species that have emerged from eggs laid during the present season, while they suppose the others to be full-sized grubs of our greyback cockchafer, but hatched the previous year. It may interest growers to learn that these small larvæ, in evidence just now, represent the second stage of *Lepidiota frenchi*, a destructive scarabæid beetle of a dark reddish-brown colour, and figured in Bulletin No. 3 of this Office ("Notes on Insects Damaging Sugar Cane in Queensland," p. 37, fig. 41). Its metamorphosis apparently occupies a period of two years, while the complete life-cycle of *albohirta* (from egg to perfect insect) takes only twelve months.

Although both beetles oviposit during December and January, the grubs of the latter species attain full growth in a space of about six months (January to June), pupating, as a rule, from July to September: whereas those of *frenchi*, which mature very slowly, remain in the larval stage for fully a year longer; thus accounting for the present occurrence in the same furrow or large and comparatively small grubs.

Owing to its two years' life-cycle, the second and third larval stages of *frenchi* are both procurable during winter months.

Fully-grown grubs of this insect are usually mistaken for those of *albohirta*, which they closely resemble in size and general appearance. As mentioned in a previous report, *Lepidiota frenchi*, although feeding habitually on roots of cereals and other herbaceous plants, has already acquired a liking for cane ("Australian Sugar Journal," Vol. VIII., p. 917).

A decided outbreak of this pest, which occurred recently at Meringa on red volcanic soil, was investigated on the 30th May, when 186 second-stage grubs were collected in a few hours from 50 chains of furrow, representing about 2,418 grubs per acre, or 0·85 to each stool of cane. Although one of our serious cane beetles, second perhaps to *albohirta* in economic importance, this insect fortunately oviposits, as a rule, in uncultivated soil that is densely covered by grass or weeds, &c. This being the case, it behoves growers to maintain, during December and January, a system of clean culture on areas devoted to cane, and more particularly on fallow land that may be reserved for the planting of an early crop. Both *Lepidiota frenchi* and *albohirta* lay their eggs during these months, and are strongly attracted by a luxuriant growth of vegetation between the rows, so that land in this condition is almost sure to become badly infested. The former insect (*frenchi*) usually oviposits freely in such fallow land, with the result that, when it is ploughed for the early crop in May or April, the grubs from these eggs, being about five months old and still small, are often overlooked or allowed to remain in the soil. As a matter of fact, however, these young larvæ have still about a year to pass before pupating, during which time they are capable of causing considerable injury; moreover, after such infested land has been planted and the weeds destroyed, they are necessarily obliged to subsist almost entirely on the roots of the cane.

QUEENSLAND SUGAR MILLS.

CRUSHING DATES.

The following crushing dates of Queensland Sugar Mills are in addition to those published in the June issue of the "Queensland Agricultural Journal":—

Moreton	10th July
Bingera	19th June
Fairymead	11th June
Goodwood	13th June
Palms	Middle of June
South Johnstone	Middle of June
Proserpine	Middle of June
Mount Bauple	20th June
Babinda	Started 26th May
Hambledon	17th June

General Notes.

COCOANUT BUTTER.

Owing to the high price of butter, we have had more than the usual inquiries as to how to make cocoanut butter. Everyone knows how to make cocoanut oil, but the making of cocoanut butter is quite a different process, and requires some skill. Cocoanut butter is being very largely used in the place of dairy butter in the United Kingdom and France, and before the war it was largely used in Germany. It can be used wherever dairy butter is used. Here is the process:—Grate or grind in a mill the meat of the nut as fine as it can be ground, and for the meat of each average nut add a pint of boiling water. Put this in a press, so that the milk can be squeezed out separate from the pulp. This milk can be used in place of cow's milk for any purpose, and is specially good with stewed fruit. To make butter, this milk can be separated in a separator or let stand in a pan to let the cream rise, which it should do in about the same time as the cream in cow's milk. This can be set to ripen, and be churned in the usual way. The whole process is in every respect the same as in making dairy butter. Wash out the butter-milk; add salt to taste. As a rule, this butter is white, and annatto colouring can be added. According to the size of the nuts, it should take from 6 to 10 nuts to make 1 lb. of butter. The churning should be done in a cool temperature, say between 60 to 70 degrees.—"Journal of the Jamaica Agricultural Society."

AN IMPORTANT CANADIAN INVENTION.

A correspondent of "The Watch Tower" (a Brooklyn, U.S.A., publication) gives the following account of a Canadian invention which he says bids fair to become of vast importance, especially to the farmer. Throughout Canada, the States, and all over the world are immense stacks of straw (many millions of them) which hitherto have been useless, and were burnt to get them out of the way. These are now to be very profitably utilised. A company has been organised in Moose Jaw, Canada, capitalised for the purpose of manufacturing this invention and selling it to the farmers. Briefly, the invention is this:—

The farmer can build a plant at a nominal cost, which will generate gas from the straw. This gas will light and heat the home, furnish power for the threshing machine, or any other machine needing power, or.

compressed in a tank similar to a Prestolite tank, will run the automobile at less expense by far than by present methods. Thirty minutes' work by a man, woman, or child will generate 1,000 feet of gas, which is stored in a tank for future use, and the most delicate instrument necessary is a pitchfork. This is not all. After the gas is driven off (by fire), the coke-like refuse is utilised, and the products made from a ton of straw, aside from the gas, are worth 15 dollars. These consist of tar, oils, and pitch; and, lastly, that which remains is pressed into briquettes of coal, either hard or soft, which make the very best of fuel. It costs about 1½ dollars a ton to make this coal. The installation expense is not high—a couple of ovens, a gas tank, a compressor for gas, one to compress the refuse into coal, and receptacles for the tar and coal.

The writer says he visited the demonstration room and saw all the processes.

RESISTANCE OF BUDDED COTTONS TO DISEASE.

Mr. Harland states in the Report of the Agricultural Department for St. Vincent, 1915-1916, that during the year a study was made of the resistance of budded cottons. The budding of cottons is a simple operation. A young plant about 2 feet high can be used as stock, the bud being inserted about 1 foot from the ground. Provided that the sap is flowing freely in both stock and scion, it is immaterial whether petioled or non-petioled budwood is used, or whether the stock and the branch from which the bud is taken are approximately of the same diameter or not.

The following conclusions are arrived at from a study of the behaviour of budded cottons:—

(1.) If the stock is susceptible and the scion immune, the scion retains its immunity completely.

(2.) If the stock is immune and the scion susceptible, budding apparently confers on the scion a certain degree of resistance.

(3.) If the stock is fairly resistant and the scion susceptible, the scion remains susceptible, though perhaps not so susceptible as when on its own roots.

(4.) If the stock is susceptible and the scion fairly resistant, the same degree of resistance is retained by the latter.—"Agricultural News," Barbados.

CO-OPERATIVE PLOUGHING.

Last year a co-operative society was formed in France for machine ploughing. The society is composed of eight members, who farm between them about 578 acres. The fields are situated close to each other, and are from 25 to 62 acres each, and on flat or slightly undulating ground, thus being in all respects favourably situated for ploughing machines. About one-third of the acreage is heavy clay, the rest is loam. The

co-operative society uses a 25-horse power tractor and a three-furrow plough. The tractor cost about £525, and the plough £56; the expense is borne by eight members in proportion to the areas to be ploughed. The statutes of the society are copied from the model drawn up by the Ministry of Agriculture. The yearly subscription of each member is 16s., and the supplementary contributions may not exceed £4. The expenses of all kinds will be divided every month *pro rata* of the acreage ploughed during the time. The order of succession in which the members are to use the outfit is settled by drawing lots, and when the machine has been round once the order will be reversed. A preference, however, is given to the heavier land, which is to be ploughed during fine weather. The society has been granted a subvention of about £160 by the Ministry of Agriculture.—"Producers' Review."

A PROFITABLE RHODES GRASS CROP.

Rhodes Grass as a forage crop appears to be driving Paspalum into the background. Since it was first introduced it has made rapid progress in the estimation of dairy farmers and agriculturists generally as a splendid fodder for stock. The accompanying illustration shows portion of a fine field of 30 acres growing on Mr. H. A. Flynn's farm at Narko,

PLATE 4.—A PROFITABLE RHODES GRASS CROP.

on the Cooyar railway line, about 40 miles from Toowoomba, which has been cut twice during the season. The grass averages 5 feet 6 inches in height, and the whole of the seed has been sold to a firm of seedsmen in Brisbane. For the past six years Mr. Flynn has regularly harvested the seed.

SOCIETIES, SHOW DATES, ETC.

Dalby.—Dalby Pastoral and Agricultural Society.—The show dates have been changed from 1st and 2nd August to 3rd and 4th October.

Deeford.—Alma Creek Branch of the Queensland Farmers' Union. J. Erickson, hon. secretary.

Kilcoy.—Kilcoy Pastoral, Agricultural, and Industrial Society. Show dates, 12th and 13th July.

Palmwoods.—Palmwoods Progress and Fruit Growers' Association. Norman Cope, secretary.

Tara.—Gums and South Glen Branch of the Queensland Farmers' Union. R. F. Morkham, secretary.

Waverley.—Wondalli Branch of the Queensland Farmers' Union, *viâ* Yelarbon. C. H. Cameron, secretary.

Answers to Correspondents.

TO ASCERTAIN THE AREA OF A FIGURE WITH FOUR SIDES OF UNEQUAL LENGTH WITHOUT OBTAINING A DIAGONAL.

"ENGINEER"—

This can only be ascertained by a trigonometrical formula which is somewhat difficult to understand without mathematical knowledge. If one angle of the figure is a right angle, then the solution is easy, because the hypothenuse can be found by adding together the squares of the base and perpendicular, and finding the square root of sum. This will then divide the figure (which may be a trapezium or a trapezoid) into two triangles, the area of each of which can be found by the rule given in this Journal for January, 1915,* inasmuch as the hypothenuse will be the third side of each triangle. If all angles are obtuse or acute, the only way is to find the sine by the use of instruments, and from that calculate the length of a diagonal, when the calculation is easy by dividing into triangles.

Example.—$19 + 15 + 14 = \frac{48}{2} = 24 - 19 = 5$

$24 - 15 = 9$

$24 - 14 = 10$

$24 \times 5 = 120 \times 9 = 1080 \times 10 = 10800$, the square root of which is 10·40 acres.

* To obtain the area of a block in triangular form with sides, say, 14, 15, and 19 chains respectively, add the three sides together, and take half the sum. Then multiply the half sum and the three remainders together. The square root of the last product will give the area.

TREATMENT FOR WORMS IN A FOAL.

F. E. DEDUHN, Hillside, Rosewood—

Your letter relative to an affection from which a foal is suffering was referred to the Veterinary Department, and Veterinary Surgeon Speer reports as follows:—

"As the foal is only six months old, I am strongly against drenching, as it is somewhat risky. The worm is probably *Ascaris megalocephalus*, and, except for sometimes causing attacks of colic, I do not think is very harmful. I should advise the following:—

Saccharated carbonate of iron, 15 grains; sulphate of iron, 15 grains. Make one powder.

Give one powder night and morning in damp food for 14 days; also, add a ration of coarse salt to the feed. These powders are practically tasteless, and there should be no difficulty in getting the foal to eat them. A dose of castor oil before starting the powders and a dose to clear the foal out when they are finished are advisable."

THE McMASTER PATENT MOTOR GATE.

INTERESTED, Dalby—

This gate is made in two sections each 12 feet long by 8 feet wide. The sides are of angle steel hinged to the entrance posts. The battens, as shown in photo, are 6 inches by 1½ inches hardwood bolted to the angle steel sides with an extra support of a 4-inch by 1½-inch batten in centre, bolted to battens on the rising and falling end of the gate. A

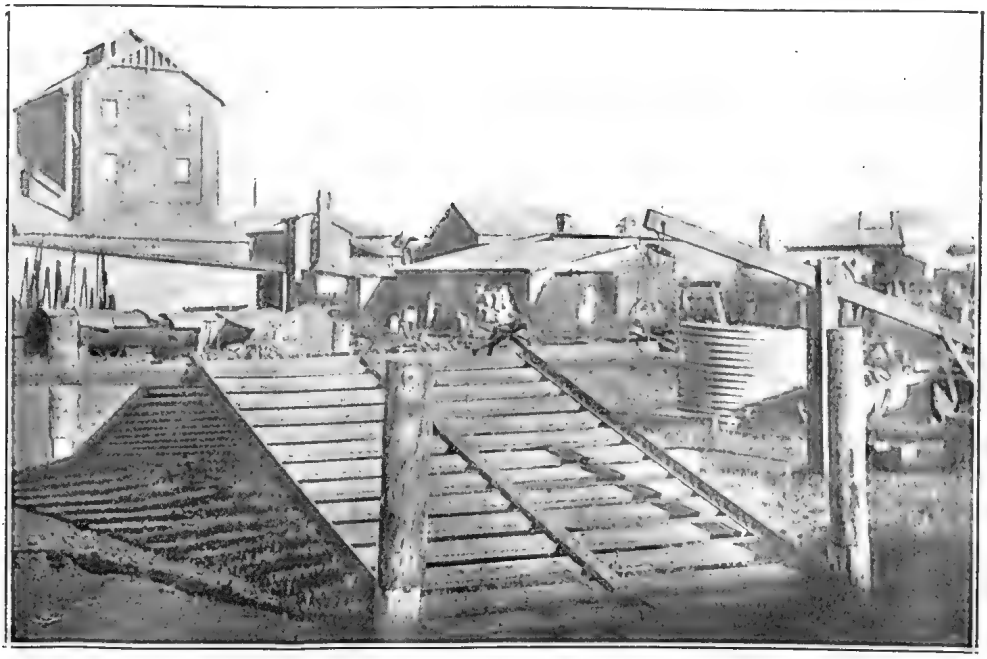

PLATE 5.—THE MCMASTER PATENT MOTOR GATE.

5-inch by 3-inch hardwood stringer is bolted to the angle frame. These stringers are attached to a rocking beam with eye-bolts and chains. There are two beams, 6 inches by 3 inches hardwood, 12 feet long, hinged in centre through a hardwood post, 7 inches by 7 inches. On the opposite end of each beam is a balance box of 1½ inches hardwood strongly made and secured to beam by wrought-steel plates. These boxes are of sufficient capacity to hold soil or gravel to balance the gate. The agents consider this an improvement to the gate erected on the Winton road. There is less friction with the beam than with a rope running over pulleys, and you can also balance the gate better than with cast-iron weights, and at less cost.

The agents for the gate are Messrs. Burns and Twigg, engineers, Rockhampton, who supply gate complete, also plan for erection of same, for £20 f.o. truck or steamer, Rockhampton. Shipping weight, 28 cwt.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1917.

Article.		JUNE.
		Prices.
Bacon	lb.	9d. to 1s.
Barley (Cape)	bush.	2s. to 2s. 6d.
Barley (Spineless)	„	3s. 9d. to 5s. 6d.
Bran	ton	£5 15s.
Broom Millet	„	£19 to £24
Butter (1st grade)	cwt.	158s. 8d.
Chaff, Mixed	ton	£3 10s. to £6
Chaff, Oaten	„	£5 to £5 10s.
Chaff, Lucerne	„	£4 to £5 10s.
Chaff, Wheaten	„	£2 10s.
Cheese	lb.	9d. to 9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	...
Hay, Lucerne	„	£2 10s. to £3 10s.
Honey	lb.	5d. to 5½d.
Maize	bush.	2s. 7½d. to 2s. 8½d.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£7 to £8
Peanuts	lb.	3d. to 4½d.
Pollard	ton	£7 2s. 6d.
Potatoes	„	£5 15s. to £6 10s.
Potatoes (Sweet)	sug. bag	1s. to 1s. 6d.
Pumpkins (Cattle)	ton	£2 to £2 5s.
Eggs	doz.	1s. 7d. to 2s.
Fowls	per pair	3s. to 4s. 6d.
Ducks, English	„	3s. 6d. to 3s. 9d.
Ducks, Muscovy	„	4s. to 5s.
Ducks (Wild)	„	3s. 6d.
Geese	„	6s. to 7s.
Turkeys (Hens)	„	7s. to 8s.
Turkeys (Gobblers)	„	13s. to 15s.
Wheat (Milling)	bush.	4s.
Hares (alive)	per pair	15s.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per bundle	...
Cabbages, per dozen	2s. 6d. to 7s.
Cauliflowers, per dozen	3s. to 10s.
Celery, per bundle	...
Cucumbers, per dozen	2s. to 3s. 6d.
Beans, per sugar bag	5s. to 7s.
Peas, per sugar bag	6s. to 10s. 6d.
Carrots, per dozen bunches	10d. to 1s.
Chocos, per quarter-case	2s. to 2s. 2d.
Beetroot, per dozen bunches	8d. to 9d.
Marrows, per dozen	1s. 6d. to 4s.
Lettuce, per dozen	1s. to 2s.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per sugar bag	1s. to 1s. 6d.
Table Pumpkins, per dozen	1s. 9d. to 3s.
Tomatoes, per quarter-case	1s. to 4s.
Turnips, per dozen bunches	10d. to 1s.
Rhubarb, per dozen bundles	..

SOUTHERN FRUIT MARKETS.

Article.	JUNE. Prices.
Bananas (Queensland), per case	6s. to 12s.
Bananas (Fiji), per case	14s. 6d. to 16s. 6d.
Bananas (G.M.), per case	16s. 6d. to 18s.
Custard Apples, per tray	5s. to 7s.
Lemons (Local), per bushel-case	...
Mandarins, per bushel-case	6s. to 7s.
Oranges (Navel), per case	6s. to 10s.
Oranges (other), per case	6s. 6d. to 7s. 6d.
Papaw Apples, per half-bushel-case	8s. to 9s.
Passion Fruit, per half-case	1s. 6d. to 6s. 6d.
Persimmons, per half-case	1s. 6d. to 3s. 6d.
Pineapples (Queens), per double-case	10s. to 12s.
Pineapples (Ripleys), per double-case	8s. to 10s.
Pineapples (Common), per double-case	7s. 1d. to 9s. 1d.
Tomatoes, per half-bushel-case	6s. to 8s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JUNE. Prices.
Apples, Eating, per case	9s. 6d. to 11s.
Apples, Cooking, per case	9s. to 10s.
Bananas (Cavendish), per dozen	1d. to 3½d.
Bananas (Sugar), per dozen	2d. to 3d.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. to 3s. 6d.
Custard Apples, per tray	3s. to 3s. 6d.
Granadillas, per quarter-case	...
Grapes, per lb.	...
Lemons (Lisbon), per quarter-case	3s. 6d. to 4s. 6d.
Limes, per quarter-case	3s. to 4s. 6d.
Mandarins, per quarter-case	3s. to 5s. 6d.
Oranges (Navel), per case	9s. to 10s.
Oranges (other), per case	2s. 6d. to 3s.
Oranges (Seville), per hundredweight	11s.
Papaw Apples, per case	1s. 6d. to 3s.
Passion Fruit, per quarter-case	3s. 6d. to 4s. 6d.
Pears, per quarter-case	8s. to 10s.
Peanuts, per lb.	3d. to 4½d.
Persimmons, per quarter-case	4s. to 5s.
Pineapples (Ripleys), per dozen	5s. to 8s.
Pineapples (Rough), per dozen	9d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Pomeloes, per hundredweight	9s. to 10s.
Quinces, per quarter-case	3s.
Rosellas, per sugar bag	3s. 6d. to 4s.
Strawberries, per dozen boxes	6s. to 12s. 3d.
Tomatoes, per quarter-case	1s. 6d. to 3s. 9d.

TOP PRICES, ENOGGERA YARDS, MAY, 1917.

Animal.	MAY. Prices.
Bullocks	£18 5s. to £22 12s. 6d.
Cows	£12 15s. to £13 15s.
Merino Wethers	39s. 6d.
Crossbred Wethers	45s. 3d.
Merino Ewes	33s.
Crossbred Ewes	44s.
Lambs	33s.
Pigs (Porkers)	50s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1917.	May, 1916.		May.	No. of Years' Records.	May, 1917.	May, 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	2·05	15	3·26	2·08	Nambour	5·03	20	3·60	3·84
Cairns	4·58	34	2·39	3·60	Nanango	1·72	34	0·46	0·96
Cardwell	3·65	44	3·56	1·72	Rockhampton	1·61	29	1·09	0·14
Cooktown	2·95	40	1·47	4·67	Woodford	3·03	29	0·66	1·52
Herberton	1·57	29	3·83	1·69					
Ingham	3·53	24	3·75	1·97					
Innisfail	12·46	35	17·49	7 01					
Mossman	3·52	1	4·70	3·39	*Darling Downs.*				
Townsville	1·39	45	2·40	0·60					
					Dalby	1·39	46	0·03	0·80
					Emu Vale	1·28	20	0·11	0·79
Central Coast.					Jimbour	1·35	28	Nil	0·49
					Miles	1·77	31	0·06	0·13
Ayr	1·16	29	2·66	0·89	Stanthorpe	2·05	43	0·15	0·94
Bowen	1·39	45	1·51	1·31	Toowoomba	2·43	44	0·37	0·45
Charters Towers	0·80	34	1·35	0·73	Warwick	1·77	29	Nil	0·45
Mackay	3·96	45	1·65	3·19					
Proserpine	5·58	13	2·39	5·28					
St. Lawrence	1·92	45	1·01	0·62	*Maranoa.*				
South Coast.					Roma	1·64	42	Nil	Nil
Biggenden	2·06	17	0·92	2·42	*State Farms, &c.*				
Bundaberg	2·85	33	1·84	1·45					
Brisbane	2·91	66	0·48	1·00	Bungeworgorai	0·65	4	0·02	Nil
Childers	2·42	21	1·69	3·64	Gatton College	2·07	17	0·15	0·30
Crohamhurst	5·00	25	2·47	2·20	Gindie	1·21	17	0·10	Nil
Esk	2·25	29	0·25	0·91	Hermitage	1·48	10	0·02	0·76
Gayndah	1·67	45	1·09	0·54	Kairi	1·69	4	2·95	1·34
Gympie	3·16	46	1·61	1·75	Kamerunga	4·41	28	2·55	3·31
Glasshouse M'tains	3·68	8	2·18	1·60	Sugar Experiment Station, Mackay	3·76	19	2·99	2·91
Kilkivan	2·09	37	0·77	0·91	Warren	0·37	4	0·17	0·06
Maryborough	3·07	45	2·54	5·76					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·32	4·59	6·40	5·4	6·30	5·18
2	6·13	5·16	6·32	4·59	6·40	5·4	6·30	5·18
3	6·14	5·15	6·33	4·59	6·40	5·4	6·29	5·19
4	6·15	5·14	6·33	4·59	6·40	5·5	6·29	5·19
5	6·15	5·14	6·33	4 59	6·40	5·5	6·28	5·20
6	6·16	5·13	6·34	4·59	6·40	5·5	6·28	5·20
7	6·15	5·12	6·34	4·59	6·40	5·6	6·27	5·21
8	6·17	5·12	6·34	4·59	6·40	5·6	6·26	5·21
9	6·17	5·11	6·35	4 59	6·40	5·6	6 25	5 22
10	6·18	5·11	6·35	4·59	6 39	5·7	6·24	5·22
11	6·19	5·10	6·35	5 0	6·39	5·7	6·23	5·23
12	6·20	5·9	6·36	5·0	6·39	5·8	6·22	5·23
13	6·21	5·9	6·36	5·0	6·39	5·8	6 21	5 24
14	6·21	5·8	6·36	5·0	6·39	5·9	6·20	5·24
15	6·22	5·8	6·36	5 0	6·38	5·9	6·19	5·25
16	6·23	5·7	6·37	5·0	6·38	5·10	6·18	5·25
17	6·23	5·7	6·37	5·0	6·38	5·10	6·17	5·26
18	6·24	5·6	6·37	5·0	6·37	5·11	6·16	5·27
19	6·24	5·6	6·37	5·0	6 37	5·11	6·15	5·27
20	6·25	5·5	6·38	5·0	6·36	5·12	6·14	5·28
21	6·25	5·5	6·38	5·1	6 36	5·12	6·13	5·28
22	6·26	5·4	6·38	5·1	6·35	5·13	6·12	5·29
23	6·27	5·3	6·38	5·1	6·35	5·13	6·11	5·29
24	6·27	5·3	6·38	5·1	6·34	5·14	6·10	5·30
25	6·28	5·2	6·39	5·2	6 34	5·14	6·9	5·30
26	6·29	5·2	6·39	5·2	6·33	5·15	6·8	5·31
27	6·29	5·1	6·39	5·2	6·33	5·15	6·7	5·31
28	6·30	5·1	6·39	5·3	6·32	5·16	6·6	5·32
29	6·30	5·0	6·39	5·3	6 32	5·16	6·5	5·32
30	6·31	5·0	6·39	5·3	6·31	5·17	6·4	5·33
31	6·31	4·59	...	...	6·31	5·17	6·3	6·33

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
7 May	○	Full Moon	12	43	p.m.
14 „	☽	Last Quarter	11	48	a.m.
21 „	●	New Moon	10	47	„
29 „	☾	First Quarter	9	33	„

The Moon will be nearest the earth on the 14th, and at its farthest distance on the 28th.

5 June	○	Full Moon	11	7	p.m.
12 „	☽	Last Quarter	4	38	„
19 „	●	New Moon	11	2	„
28 „	☾	First Quarter	2	8	a.m.

The Moon will be nearest the earth on the 9th, and at its farthest distance on the 25th. It will cause a partial Eclipse of the Sun on the 19th, visible in the Arctic Regions but not in Australia.

5 July	○	Full Moon	7	40	a.m.
11 „	☽	Last Quarter	10	12	p.m.
19 „	●	New Moon	1	0	„
27 „	☾	First Quarter	4	40	„

The moon will be nearest the earth on the 7th, and at its greatest distance on the 22nd. There will be a *Total Eclipse* of the *Moon* from 6·51 to 8·27 a.m. on the 5th; but only the moon's entrance into the shadow of the earth will be seen in Eastern Australia.

3 Aug.	○	Full Moon	3	11	p.m.
10 „	☽	Last Quarter	5	56	a.m.
18 „	●	New Moon	4	21	„
26 „	☾	First Quarter	5	8	„

The moon will be nearest the earth on the 4th, and at its greatest distance on the 18th.

* For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reprodnced without acknowledgment.]

* These notes will not again be published until September, as they apply to the series from May to August.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds, which will begin to vigorously assert themselves as the weather gets warmer; therefore, keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines; and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn-out sugar lands in the Central and Northern districts, if not intended to be manured and replanted, will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown, which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie

in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look them over occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall was 2·63 inches, and for September 2·07 inches, increasing gradually to a rainfall of 7·69 inches in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the spring growth. All heavy pruning should be completed previous to the rise in the sap; and where winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well-balanced main branches cut off at about 2 ft. from the trunk. When cut back, give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should

be thinned out to form a well-balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good, clean grown stocks budding is to be preferred.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient; but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well matured; avoid extra strong or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during spring. This is a very important matter, as spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop to a greater or less extent.

Where necessary, quickly acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but in the case of pines they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and

from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead —viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for spring.

In the warmer parts, grape pruning should be completed, and the vines should receive the winter dressing for black spot. In the Stanthorpe district grape pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, head back and work out by budding on the young growth.

QUEENSLAND COTTON PRODUCTION IN 1916.

The total quantity of raw cotton dealt with at the State Ginnery in 1916 by the Department of Agriculture and Stock on growers' account was 29,230 lb., from which was obtained 10,066 lb. of prime lint, 18,284 lb. seed, and 880 lb. second-class lint. The number of pounds of seed cotton required to produce 1 lb. of lint was 2·90 lb., and for 1 lb. of seed 1·6 lb. of seed cotton. The percentage of lint to raw cotton was 34·4, and 1 lb. of raw cotton produced ·344 lb. of lint. The lint was sold locally, ex Store, at 6·9d. per lb., the best lint bringing 7d. per lb. The seed was purchased by the Department for redistribution to farmers for planting during 1917. After deducting ginning expenses, the growers received a net return of 2/54d. per lb. for their seed cotton, which at the average of 1,000 lb. of seed cotton per acre was equal to a gross return of £10 11s. 8d. per acre. Deducting the expenses of raising and picking a 1,000-lb. crop, the net return was £7 14s. 9d. per acre. The picking cost averaged £2 1s. 8d. per acre, and where the grower kept the cost of picking in his own family, he saved this cash outlay.

How does this compare with maize-growing? A 40-bushel crop at 2s. 3d. per bushel in a good season gives a net profit of £2 18s. 4d. per acre. Of all our ordinary farm crops, rice is the only one which can compete in value with cotton. An acre of rice producing 30 bushels is worth £6 for grain (probably more in these war times) and the same for the straw. It costs over £3 to produce an acre of rice, the net profit being £8 16s. 3d. The net profit on wheat on the same basis and including straw is about £2 16s. when wheat is selling at 3s. per bushel. On barley it is about £3, and on maize, with a 30-bushel crop, £2 3s. And over all these crops, cotton presents the additional advantage of less labour in harvesting, and in keeping qualities owing to its freedom from weevils or other troublesome insects.

THE FUTURE DEMAND FOR COTTON.

With regard to the future demand for cotton, it must be remembered that of the world's population of 1,500,000,000, about 500,000,000 regularly wear clothes; about 750,000,000 are partially clothed, and 250,000,000 go quite naked, with, in many tropical countries, the small addition of a cotton loin-cloth. Now to clothe the entire population of the world would require 42,000,000 bales of 500 lb. each annually. It is highly improbable that the supply of cotton will ever exceed the demand, and we have to-day evidence that, owing to the war, and the great demand for cotton for explosives, the supply of cotton is very considerably below requirements. There is a sensible diminution in the United States of America, owing to a bad season and the ravages of the boll weevil.

amounting to a fall from 15,000,000 to 13,000,000 bales, with the result that the price of cotton has risen from 7d. per lb. to 16d. per lb. A year or two after the American Civil War, during which 14,000 acres were under cotton in Queensland, bringing 3d. per lb. for seed cotton and 1s. to 1s. 2d. per lb. in the Liverpool market, it was found that cotton was the most payable crop the farmer could grow, even had the price of cotton fallen to 8d. or 9d. per lb. in the home markets. Unfortunately for the industry in Queensland, American cotton fell as low as 4½d. per lb., and the result was that at that price cotton growing anywhere except in a black labour or slave country became out of the question.

To-day, however, with cotton likely to remain at a high price during and after the war, those who are wavering in their ideas concerning the future of cotton—that is to say, who are in doubt whether prices will keep up or whether there will be such an over-supply that prices will recede to a non-paying point—may take heart of grace and plant with good prospects before them.

The Department of Agriculture and Stock advances 1¾d. on all cotton sent to the State ginning establishment, William street, Brisbane, and all profit derived from the sale, less actual expenses, will be paid to the growers.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. VIII. AUGUST, 1917. PART 2.

Agriculture.

PRODUCTS OF THE MAIZE PLANT.

Of the multifarious products obtained from all parts of the maize plant in Europe, the United States of America, and other countries of the world, Australia produces but two—cornflour and horse-feed (either grain or green, or in the form of ensilage). In 1914, 176,372 acres were under maize in Queensland, which yielded 4,260,673 bushels of grain. The maize harvest in the following year was a poor one, amounting to a little over 2,000,000 bushels. Taking the cob as representing 18 per cent. of the ear, it will be seen what a vast quantity of cobs has been produced only to be destroyed as valueless. Now these cobs have a very considerable value as stock food, as has long ago been demonstrated in the long-continued general experience of American farmers. Apart from this, a ton of ordinary wood when burnt only gives 100 lb. of potash, 32 lb. of phosphoric acid, and 640 lb. of lime. But a ton of corn cobs burnt into ash gives 500 lb. of potash, 90 lb. of phosphoric acid, and 140 lb. of lime. So much for the manurial value of the cobs.

What are we losing in the way of other products of the maize plant? Generally speaking, people have no idea of the thousand and one ways in which the Americans utilise maize. This plant is to them more precious than is the bamboo to the Orientals. The pith of the stalk

is converted into cellulose, which is utilised in the manufacture of smokeless powder and other high explosives in vast demand during the present war. Cellulose is largely used for packing cofferdams and belting of battleships; pyroxiline varnish is a liquid made from cellulose, the uses of which are practically unlimited. The pith is used as an insulating material in refrigerating chambers and cars, ships' holds, electric dry batteries, and as casing for pipes of steam generators. It also enters largely into the manufacture of a washable floor cloth superior to linoleum.

Besides being put to these uses, the pith of the maize stalk is used in enormous quantities in dynamite factories under the name of "wood meal."

Out of the spathes or husks covering the cob is produced a material which, in America, is utilised to manufacture various tissues, straw mats and hats, and, above all, a tough parchment paper for envelopes and bank notes. Every part of the plant can be utilised. The stalks and leaves are used in a thousand industries.

Besides starch, another product of the grain is dextrine for fixing the colours in cloth. Whisky, eau-de-cologne, &c., are distilled from it. Enormous quantities of glucose are manufactured from maize, and this actually finds its way to the tables of fashionable America under the name of golden syrup.

The grain is also made to produce a bright, tasteless oil, which is largely used in adulterating olive and cod-liver oil.

Finally, rubber is extracted from it by vulcanising the oil.

Briefly, every conceivable product is obtained from maize except crystallisable sugar, as maize sugar will not granulate, for which reason it is made into golden syrup.

The finest book paper can be made out of the stalks.

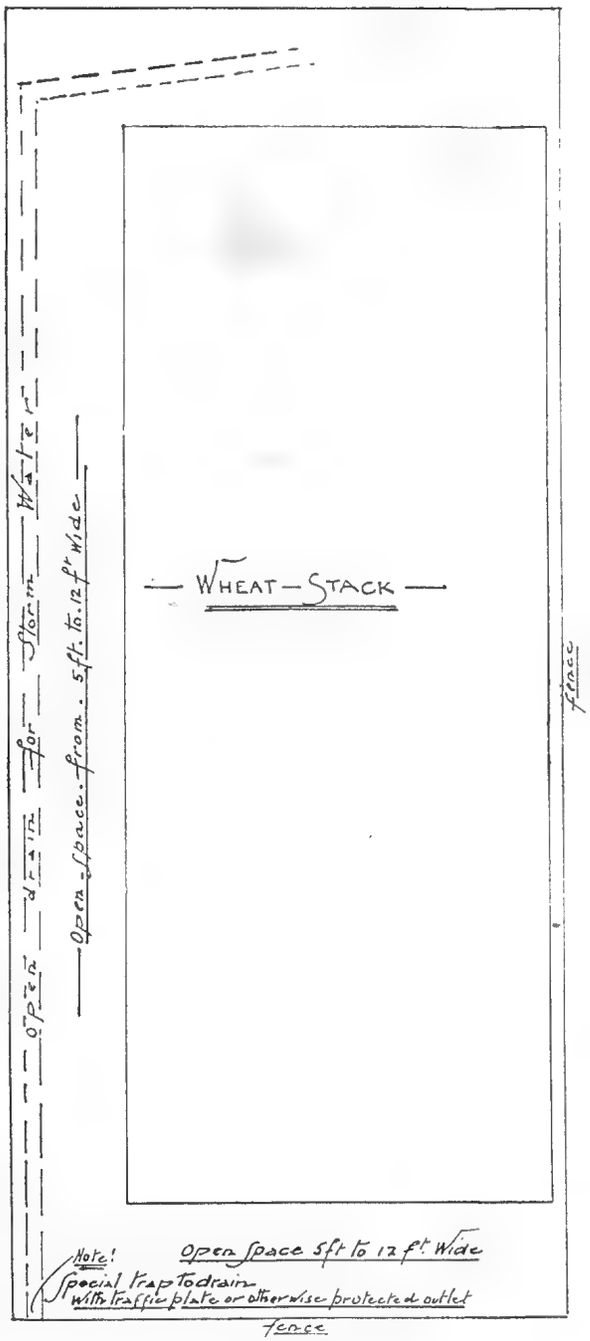
All these products have for years been left to rot in the fields of Queensland farmers. Not even have any farmers utilised the cobs by grinding them into stock food as is done in America. When shall we wake up to a sense of the hidden wealth in our Queensland products, and come to the front with these products as do the Americans?

PROTECTING WHEAT STACKS FROM MICE.

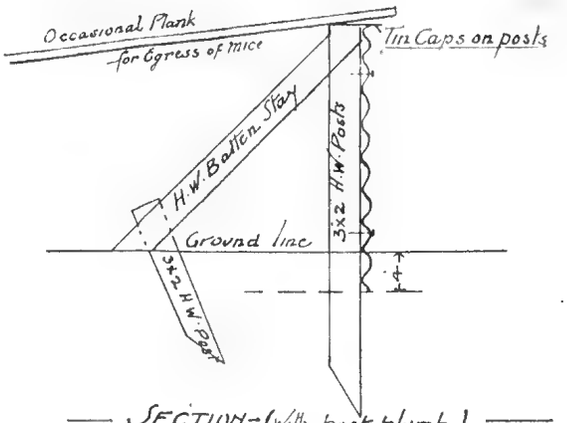
In response to a request from the Department of Agriculture and Stock, Brisbane, for information in regard to the methods adopted in New South Wales for destroying mice in wheat stacks, Mr. G. Valder, Under Secretary and Director, Department of Agriculture in the

Detail Drawing of Mouse-Proof Fence

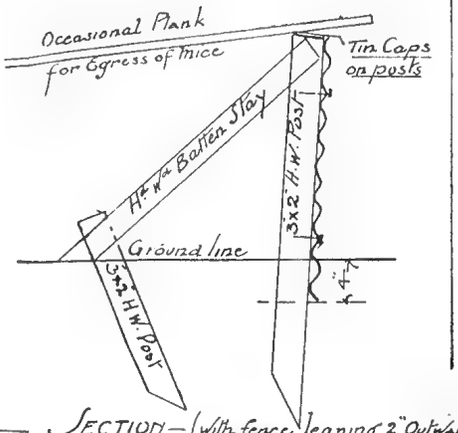
Around Wheat Stacks



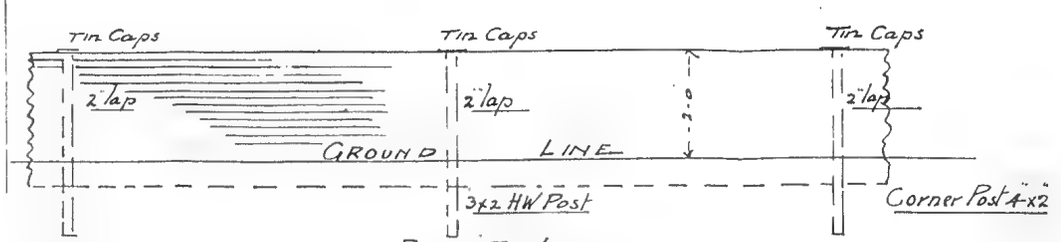
Block Plan
1/8th Scale



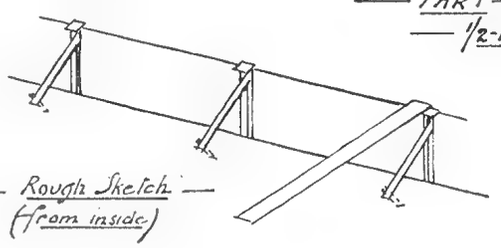
Section (with post plumb)
Inch Scale



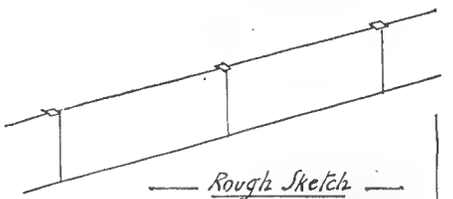
Section (with fence leaning 2" Outward)
Inch Scale
Alternative



Part Elevation
1/2 Inch Scale



Rough Sketch
(From inside)



Rough Sketch
From Outside

MELBOURNE

Southern State, has courteously supplied the following information on the subject:—The stacks are being protected by means of mice-proof galvanised iron fences, and various methods for the destruction of the mice within the stacks are being used, such as kerosene tins half full of water laid in the ground to act as traps; also poison, where it can be safely used, and means of allowing the mice to leave the stack over the fence without being able to return to it. Mr. Valder also forwarded a sketch showing the method of erecting the fence which is here reproduced. The cost of galvanised iron has been considerably advanced since the rise in price of metals during the war, but second-class iron, even perforated by nail holes, would prevent the mice from getting through. New iron is quoted at from £70 to £81 per ton. Second-hand with nail holes 5s. 2d. per sheet.

COTTON SEED FOR DISTRIBUTION.

Cotton-ginning at the Department of Agriculture and Stock commenced last month, and seed will be supplied to intending planters gratis on application to the Under Secretary, stating what area the applicant intends to plant. In July, 1916, the total quantity of cotton purchased by the Department from farmers was 29,500 lb. In the same month of 1917 the quantity purchased was 59,000 lb. and consignments were still coming in.

MARKET GARDENING.

A NEW METHOD OF SELECTING TOMATOES FOR RESISTANCE TO THE WILT DISEASE.

By C. W. EDGERTON.

Perhaps the most serious disease of tomatoes in the southern United States is that caused by *Fusarium lycopersici,* commonly known as the tomato wilt. The fungus lives in the soil and attacks plants through the roots, later growing up through the fibrovascular bundles into the stems. In this, as in similar diseases, the only practical method of control now known is in the use of varieties, or strains, that are resistant to the disease. By saving seed from healthy plants in a badly infected field for several seasons, strains can be obtained which show considerable resistance to the disease. This method has, however, several drawbacks: (1) Many of the plants in the field do not come in contact with the wilt

fungus during the season and so do not have a chance to show whether they are resistant to the disease; (2) resistant plants in the field are readily pollinated by the susceptible plants; (3) the time necessary to obtain a wilt resistant strain is too long.

To avoid all these drawbacks, the writer has tried to improve on the old method by selecting resistant plants from the seed bed.

In ordinary unsterilised soil, even if it is heavily inoculated with the tomato wilt fungus, not many of the plants will show the wilt to any extent before it is time to place them in the field. The presence of bacteria and other fungi seems to have an inhibitory effect on the wilt fungus. If, however, the soil is first sterilised by heat and then heavily inoculated with the wilt fungus just before planting, the disease will develop so well that all the plants will be attacked and the most susceptible will be killed before they are large enough to be placed in the field. This guarantees the degree of resistance of the surviving plants which are placed in the field.

To show how this method works in practice, results of some experiments may be briefly given. Having by the old method of selection obtained a strain that showed considerable resistance to the wilt disease, this was compared by the seed-bed method with three standard varieties of tomatoes. The seeds of each variety were planted side by side in reinoculated sterilised soil. Different cultures of the fungus from different localities were also used in order to see if they would affect the varieties differently. In the following table are given the percentage of living plants and of wilt-free plants of each variety sixty-eight days after planting.

Variety.	CULTURE A.		CULTURE B.		CULTURE C.		CULTURE D.	
	Living.	Healthy.	Living.	Healthy.	Living.	Healthy.	Living.	Healthy.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
"Stone"	35·3	11·8	75·0	55·0	44·7	25·5	71·4	57·1
"Acme"	14·3	0·0	42·9	28·6	31·3	21·9	65·8	31·6
"Earlianna" ..	32·3	3·2	63·5	36·5	37·3	17·7	96·0	70·0
Wilt-resistant ..	62·5	31·3	81·8	56·8	68·2	34·1	95·1	78·0

This table shows the comparatively greater resistance of the wilt-resistance variety as compared to the others, and it also shows the large percentage of susceptible plants that could be eliminated before setting in the field.—"Bull. of Foreign Agric. Intelligence," October, 1916, Department of Agric., Ottawa.

OLD *VERSUS* NEW SEED.

Fresh seed usually germinates more promptly than old seed, although there may be advantages in sowing old seed. Many gardeners claim that fresh seed of the cucurbits (melons, pumpkins, cucumbers, gherkins, &c.) tends to produce more vine and leaf and less fruit than seed several years old. But fresh seed is generally preferred, especially in the case of the onion and parsnip when the vitality of the seed is low. As far as pumpkins and cucumbers are concerned, we have obtained excellent crops from seed two years old, and also from melon seeds (the Rockyford musk melon) imported from America, some of the seed of which was sown more than two years afterwards and the vines bore heavily. The life of seeds depends upon (1) the kind of vegetables, (2) conditions under which they were grown, (3) thoroughness of curing, (4) storage conditions.

There is a common belief among growers of pumpkins that to get the best results, new seed should not be used; it should be two or three years old. And there is scientific evidence to support that belief. The tendency is for seeds to give less vigorous development as they are old; in other words, their vegetable capacity decreases. Plants raised from fresh seed tend toward a more robust growth than do plants from older seed.

A New South Wales departmental expert mentions an actual case where a trial was made between new and old pumpkin seed. The plants grown from new seed were the largest and strongest; those from old seed came later, and were weaker plants, but returned a much larger yield in fruit. In this trial the strong barren plants were nipped back, and the laterals that developed carried a much better supply of fruiting flowers.

There is other evidence to show that if the original stems grow vigorously and unchecked, they tend to throw mainly male (pollen-bearing) flowers; but that if the ends be pinched off when young, only four or five leaves being left, lateral branches will come away, on which the proportion of fruiting (female) flowers will be much greater.

This seems to bear out the statement that strong vines may tend to fruit indifferently, whereas weaker plants, or plants that have suffered a check, produce many fruiting flowers, and, consequently, give a much better return in fruit.

Mr. F. F. Coleman, Inspector under the Pure Seed Act, Department of Agriculture and Stock, Queensland, when on a visit to M. Vilmorin's establishment in France, found that experiments had been made there with cucumber seeds ten years old, and such seeds produced vines laden

with fruit. M. Vilmorin did not continue his experiments, as he considered enough had been done to show that very old cucurbit seed was even more productive than fresh seed, and Mr. Coleman had personally verified this by growing cucumbers from ten-year-old seed.

The following table given in R. L. Watts's (Professor of Horticulture in the Pennsylvania, U.S.A.) excellent work on "Vegetable Gardening" shows the maximum ages of properly cured and stored vegetable seeds when they will be likely to germinate satisfactorily. But he remarks that it is not best to place too much reliance upon tables of this character, the only certain means of determining the vitality of seeds being to make germination tests:—

Seed.	Years.	Seed.	Years.
Artichoke	2	Musk melon (rock melon)	5
Asparagus	2	Okra	4
Bean	3	Onion	1
Beet	4	Parsley	1
Cabbage	3	Parsnip	1
Carrot	1	Pea	3
Cauliflower	4	Pepper	3
Celery	2	Radish	2
Cucumber	5	Salsify	2
Egg plant	5	Squash (pumpkin) ..	3
Endive	2	Tomato	5
Kale	2	Turnip	4
Kohl-rabi	3	Water melon ..	5
Leek	3		
Lettuce	4		

LAYING OUT A SMALL ORCHARD.

If the land is laid out in equilateral triangles, more trees may be planted to the acre than on the square system. By the former arrangement half an acre will carry 97 trees, whereas by the latter only 85 trees can be planted. There is a further advantage gained by the triangular or, as it is called, the septupal system, which is, that the land can be cultivated in three different directions, a great consideration is these days of high cost of labour.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	2	6	Ayrshire Herd Book of Queensland
		2	3	Holstein-Friesian Herd Book of Australia
		3	13	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Frisian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Frisian Herd Book of Queensland
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking.. ..	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH MAY TO 26TH JUNE, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Margaret	Ayrshire	14 Sept., 1916	734	4·6	39·78	
Lady Melba	Holstein	14 Feb., 1917	934	3·5	37·84	
Miss Betty	Jersey	27 Mar. ,,	546	5·0	32·23	
Snowflake ...	Shorthorn... ...	17 May ,,	568	4·6	30·78	
Iron Plate ...	Jersey	9 Dec., 1916	484	5·3	30·32	
Miss Edition	,, ...	25 Dec. ,,	484	5·2	29 72	
Miss Security	,, ...	27 Mar., 1917	625	3·9	28·66	
Lady Loch II.	Ayrshire	3 June ,,	500	4 6	27·10	
Skylark ...	,, ...	24 May ,,	605	3·8	26·95	
Cocoatina ...	Jersey	6 Mar. ,,	526	4·2	25·97	
Buttercup ...	Shorthorn... ...	2 June ,,	646	3·4	25 66	
Hedges Madge	Holstein	22 Mar. ,,	643	3·4	25·54	
Lady Annette	Ayrshire	11 Nov., 1916	369	5·8	25·33	
Belinda ..	,, ...	23 Feb., 1917	535	4·0	25·13	
Lady Spec...	,, ...	17 Jan. ,,	540	3 9	24·71	
Violette's Peer's Girl	Jersey	13 Dec., 1916	343	6·0	24·37	
Glade ...	Shorthorn... ...	29 Mar., 1917	588	3 5	24·07	
Comedienne	Jersey	24 Nov., 1916	366	5·3	22·91	
Thornton Fairetta	,, ...	26 May ,,	272	7·0	22·59	
Hedges Dutchmaid	Holstein	22 Aug. ,,	365	5·0	21·53	
Jeannie ...	Ayrshire	27 Oct. ,,	403	4·5	21·35	
Sylvia II. ...	Shorthorn... ...	16 Jan., 1917	489	3·7	21·19	

The cows were fed on a ration of Japanese millet ensilage, with wheaten and lucerne chaff in addition to natural pasturage.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1917.

Five thousand nine hundred and seventy-three eggs were laid during the month. The health of the birds has been exceptionally good, not a case of sickness requiring treatment has occurred. Most of the pens which broke into moult during the previous month are now in full lay. Weather on the whole has been good, with the exception of some very cold nights. Only five cases of broodiness have occurred among the heavy breeds, and none among the light breeds during the month. The selection of the birds eligible for the "True to Type" prizes has been made, but the publication of these is reserved for next month, when the weight of eggs will also be given and a full report submitted. Mr. J. M. Manson wins the monthly prize in the light breeds with a score of 197 eggs, while Mr. E. F. Dennis wins in the heavy breeds with 120 eggs. The following are the individual records:—

Competitors.	Breed.	June.	Total.
	LIGHT BREEDS.		
E. Chester	White Leghorns ...	122	361
W. Becker...	Do.	97	307
*G. H. Turner	Do.	127	303
Oaklands Poultry Farm	Do.	104	288
W. R. Crust	Do. ...	92	279
A. H. Padman, S.A.	Do.	93	270
G. Chester	Do.	74	269
T. A. Pettigrove, Victoria	Do.	96	266
*J. Zahl	Do.	104	266
T. Taylor	Do.	97	259
*J. R. Wilson	Do.	85	253
F. W. Loney	Do.	100	349
*A. W. Bailey	Do.	92	249
T. B. Hawkins	Do.	75	247
Moritz Bros., S.A.	Do.	133	243
Chris. Porter	Do.	102	243
C. Knoblauch	Do.	101	234
*A. T. Coomber	Do.	101	227
J. G. Richter	Do.	98	224
Mars Poultry Farm	Do.	75	222
*J. M. Manson	Do.	137	213
R. Holmes	Do.	60	210
Kelvin Poultry Farm	Do.	120	207
*Mrs. J. R. D. Munro	Do.	89	206
A. Shillig	Do.	107	202
Quinn's Post Poultry Farm	Do.	111	198
D. Fulton	Do.	90	197
*Dixie Egg Plant	Do.	90	190
G. Williams	Do.	76	185
F. Clayton, N.S.W.	Do.	73	169

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	June.	Total.
LIGHT BREEDS—*continued.*			
*T. Fanning	White Leghorns ...	82	167
J. L. Newton	Do.	101	166
Mrs. W. D. Bradburne, N.S.W. ...	Do.	58	165
*C. C. Dennis	Do.	94	160
E. Cross	Do.	36	157
Miss Hinze	Do.	80	153
L. G. Innis	Do.	80	151
*A. E. Walters	Do.	103	133
J. Holmes	Do.	82	134
C. P. Buchanan	Do.	71	131
C. H. Singer	Do.	33	130
G. J. White	Do.	95	128
Mrs. J. Carruthers	Do.	35	126
G. Howard	Do.	90	124
S. C. Chapman	Brown Leghorns... ...	82	120
E. A. Smith	White Leghorns ...	58	114
J. Ferguson	Do.	70	114
Mrs. S J. Sear	Do.	25	114
*Dr. E C. Jennings	Do.	56	99
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	116	283
A. E. Walters	Do.	93	251
W. Smith	Do.	90	249
*Mars Poultry Farm	Do	113	248
F. A Claussen	Rhode Island Reds ...	68	245
D. Kenway, N.S.W.	Black Orpingtons ...	92	213
W. S. Hanson, N.S.W.	Do.	95	211
H. Jobling, N.S.W.	Do.	52	192
Cowan Bros., N.S.W.	Do.	90	190
P. C. McDonnell, N.S.W.	Do.	97	198
*E. F. Dennis	Do.	120	176
F. Clayton, N.S.W.	Rhode Island Reds ...	68	162
King and Watson, N.S.W.	Black Orpingtons ...	10[illegible]	147
Mrs. J. H. Jobling, N.S.W.	Do.	65	136
*Oaklands Poultry Farm	Do.	38	102
C. C. Dennis	White Wyandottes ...	74	98
C. B. Bertelsmeier, S.A.	Black Orpingtons ...	58	90
R. Burns	S. L. Wyandottes ...	8[illegible]	83
*F. W. Leney	Rhode Island Reds ...	42	80
*Kelvin Poultry Farm	Plymouth Rocks ..	28	70
*E. A. Smith	Black Orpingtons ...	45	56
E. Morris	Do.	27	40
J. M. Manson	Do.	29	40
*Miss M. Hinze	Do.	32	33
Totals	...	5,973	13,405

* Indicates that the pen is engaged in the single hen test.

RESULTS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
G. H. Turner	30	52	61	56	47	57	303
J. Zahl	52	41	61	17	57	38	266
J. R. Wilson	44	43	37	44	50	35	253
A. W. Bailey	35	25	49	48	47	45	249
A. T. Coomber	46	4	49	47	31	50	227
J. M. Manson	40	30	29	28	36	50	213
Mrs. J. R. D. Munro	64	42	24	27	2	47	206
Dixie Egg Plant	27	37	40	47	39	0	190
T. Fanning	6	45	34	33	17	32	167
C. C. Dennis	31	23	0	32	34	40	160
A. E. Walters	10	20	15	32	39	17	133
Dr. E. C. Jennings	2	6	13	27	42	9	99
R. Burns	29	11	58	32	72	81	283
Mars Poultry Farm	41	57	32	52	34	32	248
E. F. Dennis	25	21	43	41	44	2	176
Oaklands Poultry Farm... ...	44	2	8	7	41	0	102
F. W. Leney	4	4	0	2	48	22	80
Kelvin Poultry Farm	21	1	0	47	0	1	70
E. A. Smith	1	0	9	35	10	1	56
Miss H. Hinze	9	5	1	10	8	0	33

POULTRY AT THE RANGEVILLE STATE SCHOOL.

We have received from Mr. Thos. Henderson, Head Teacher of the Rangeville State School, the following interesting notes on the instruction given to the scholars in poultry-breeding and egg production. The poultry yard was started in the beginning of the year, and an account of it and its feathered occupants appeared in the issue of the Journal for February, 1917:—

At present one pen of white leghorns is being kept in the Semi-Gordon House. They belong to Mr. R. Holmes, of Harlaxton. Some of the birds are Grantham strain, others champion, and the remainder a cross between Mr. Holmes's birds and Mr. E. A. Smith's, of Paddington, Brisbane.

The six birds laid 107 eggs for the month of May. They are fed on wet mash, which consists of bran, pollard, and desiccated meat mixed up with boiling water until it is quite crumbly and not sticky. Dry mash is also before them in a hopper. The dry mash consists of dry bran and pollard and dried blood. We are feeding these birds on wet mash, owing to a wish expressed by Mr. Holmes, who raised the birds on wet mash, and as a change to dry mash would probably put them off laying. Wheat is fed for grain, and is dug into the scratching material on the floor. The scratching material is horse manure. This has many advantages—(1) The ammonia in the manure eradicates vermin, and the need of a dust bath is thus abolished; (2) the value of the manure is increased for gardening purposes when removed.

Mr. Beard, the Government poultry expert, claims that birds, when fed on wet mash, lay more eggs and also larger eggs than birds which

are fed on dry mash. We, however, prefer dry mash, as it requires less labour and time, is more sanitary, easier handled, and in laying competitions has produced results equally as good as those obtained by feeding on wet mash.

Three trap nests have been installed to show the children how birds in a large pen may be individually tested as layers. When a hen enters a nest a bar drops down, which locks her in until released, and the attendant may see whether she has laid or not. The nests are kept outside the building, and have a hinged roof, which is lifted up to gather the eggs. The water also is kept outside, and the tin has two rectangular holes cut on opposite sides, and a slight draught is caused over the water, and this keeps it cool. The reason for keeping the nests and water outside is for convenience and quickness of attending to these two factors. The birds roost on a perch, under which is suspended a dropping board, which is cleaned every morning. Both perch and dropping board are hung on wires in order to prevent vermin, if any happen to be there, from going from the roosting quarters to the house and *vice versâ*.

Green feed is given every day. It is hung in the middle of the pen, and the fowls eat it as they wish.

Shell grit and crushed-up crockery are supplied in an automatic self-feeding hopper.

The pens are cleaned every morning, and all the work is done by the scholars, whose ages range from 6 to 14.

THE FOWL TICK.

Mr. J. Beard, Instructor in the Poultry Industry, Brisbane, has given the following valuable information concerning the Fowl Tick, the symptoms of its presence in the poultry yard, and the remedies for and prevention of its attacks. This information is of very great importance to poultry breeders, and should be carefully studied by our readers who are interested in the industry.

SYMPTOMS.

Fowls that have been infested by ticks and recover become immune from further attack. This explains the reason why sometimes flocks of fowl are apparently in the best of health and condition, yet, if examined, they will be found to be covered with the larval ticks, and the houses may be found swarming with the pest. If clean fowls are put into these yards they will at once become affected and, in three or four days, the result of tick worry and inoculation by the pest, fever will be at its height. The fowls will appear drooping and listless, the combs becoming quite pale; they then lose the use of their legs. Severe diarrhœa sets in, death resulting in a few hours. The better condition the clean birds are in the quicker the poison will act. The fowl ticks themselves are infested with a parasite which they pass into the blood of the fowl, where

it becomes a blood parasite, and the micro-organisms multiply with such marvellous rapidity that, in most cases, the fever causes the death of the birds. Every bird, in turn, becomes a centre of infection for healthy ticks that suck its blood, thus becoming in turn infected, and transmitting the blood parasites into a fresh victim. This disease is known as Spirochaetosis in fowls and is caused by a blood parasite. This tiny organism is conveyed from ticks to healthy fowls through the bite of the commonly known poultry tick (*Argus persicus*), its incubation period ranging from three to nine days.

The ticks are capable of transmitting the disease to healthy birds five months after feeding upon the blood of (*Sphiro-chaeta*) infested fowls.

All poultry, fowls, ducks, geese, and turkeys, are subject to the disease, but the losses are always greater amongst the first mentioned. This may be accounted for by the fact that the latter are more restless in their habits, therefore the "seed" ticks have not such opportunities of attaching themselves to these birds.

REMEDY AND PREVENTION.

Once the ticks have firmly established themselves in the fowlhouse, it is almost impossible to eradicate them. Therefore the houses and fences should be burnt, likewise any trees that may have been in the pens, and the ground thoroughly disinfected with some strong solution. From experience the following have been found very effective remedies:—Pure kerosene, crude petroleum, creosote, or some of the standard dips, used at a strength of one part of the dip to three parts of water.

The new houses should be of iron, with as little woodwork as possible. The perches, which should be tick proof, can be procured at almost any ironmongery or poultry supply store. A good plan for a perch is to put two supports of sawn timber into the ground. Drive a nail into each at the top; bore a hole in each end of the perch so that the nail will just go through, and then lay the perch in the supports. This will keep it in position, and the perch can be lifted up to see if any ticks are underneath. Tie a piece of flannel round each support of the perch about half way up and, if there are any ticks about, you will in time catch them all, as after feeding on the fowls they will start for their hiding place but, being full and lazy, will take the first shelter offering, thus you will find them under the perches or under the flannel. The latter can be removed and be burned along with the ticks that hide in it, and be replaced with fresh clean flannel.

Every care should be exercised to ascertain that all birds coming into the yard are clean and free from diseases and pests. If there is the slightest doubt, the birds should be placed in strict quarantine for

nine days and the coops in which they have been kept thoroughly inspected. If young ticks are discovered clinging to the bodies of the fowls, the birds should be dipped in a strong solution of phenol or Cooper's sheep dip, which will kill the pests. After the birds have been dipped in the solution they should be given a teaspoonful of port wine every few hours, and kept in a dry, warm place.

If the fowlhouses are not badly infected the tick can be eradicated by thoroughly spraying with some of the solutions previously mentioned.

On account of its cheapness and the fact that it is so easily prepared, the following is recommended:—Boiling hot soapsuds, to which add ½ oz. crude carbolic to the bucketful. The action of this solution is sure, and if properly applied it will penetrate into the smallest cracks and crevices, which a thicker solution would not reach.

Hot coal tar is also a good thing to use on fences and buildings, but care must be taken that it gets into all the cracks.

If whitewash is used, care must be taken that it is not applied too thick, because as the wash dries a space is left between it and the wood, which makes a good harbour for the pests.

There is yet another method which I have found to be very effective and that is the use of a blow lamp (such as painters use). The heat and flame from this lamp will penetrate into the smallest cracks and kill all pests that may be concealed therein.

If the poultry keeper will follow out these simple instructions, his yard should soon become free from the pest, and if it does not remain so, he will only have himself to blame for lack of the precautionary measures suggested in regard to the introduction of fresh birds, coops, &c., or non-observance of those warnings contained therein.

FRUIT CANNING WITHOUT SUGAR.

A correspondent of the "Farm Journal," Sydney, writes:—

I came across a very good way of canning small fruits without sugar, and as I have been very successful with it, I thought someone else might like to try. Warm your bottle well in the oven, then fill with fruit. Pour in boiling water till it is as full as it can be.' Put back in oven and leave until the bottle begins to boil again. Take out and put on rubber ring and screw top, previously well warmed. Stand jar on its head until cold, give an extra "screw" if necessary—and the thing is done. I did plums and nectarines early in the season, and they look lovely and are keeping well. I intend to do gooseberries and other materials now.

The Orchard.

SCARING BIRDS FROM FRUIT TREES.

A correspondent of the "New South Wales Agricultural Gazette," says he effectively overcame the bird trouble by making an effigy representing a hawk and suspending it on an overhead wire. This completely scared the small birds away, but the crows made a concerted attack on it. He therefore studded it all over with long darning needles, points outwards. On examination he found several of these broken off, and after a while the crows ceased to attack. The experiment was most successful as he had very little pecked fruit that season.

THE ORIGIN OF THE NAVEL ORANGE.

In the last month's issue of the Journal we published an article taken from the " Agricultural News" of Barbados, on the above subject. It was therein stated that the average annual production of forty-year-old trees in Brazil is about 100 oranges per tree, and the average annual rainfall in Bahia is about 50 inches. Mr. C. Ross, Instructor in Fruit Culture, says that in Queensland the average crop of these trees is about 400 per tree under lesser rainfall conditions, and forty year-old trees should produce even more. This contention is amply borne out by the average annual returns from Queensland orange plantations.

A FINE BUNCH OF BANANAS.

Mr. Kaminksi, owner of the "Sunbeam Fruit Farm," the Mountain, Nikenbah, sends a photograph, here reproduced, of a fine bunch of bananas and some pineapples grown on his orchard without the aid of any fertilisers. The banana bunch contains 20½ dozen good marketable fruit and the pines weighed 10 lb. each. The soil must be of first-class quality to produce such fruit without the application of manure, and the knowledge that this can and has been done should give great encouragement to those of our gallant soldiers who on their return from the European battlefield may elect to settle down to the peaceful life of fruit-farming on many of the suitable lands now being surveyed and reserved for returned soldiers. Nikenbah is 21 miles from Maryborough.

Mr. Kaminski has since stated that the soil on which the fruit was grown is practically new ground, and the bananas were of the third cutting, the pines, part of the fourth crop. The soil is of a grey colour and fairly stony, and the bananas thrive best amongst the largest stones. In fact, almost any fruit planted does well in the district as the majority of the land is highly situated and close to the sea.

Plate 6.—Bananas and Pineapples from Mr. Kaminski's Farm, Nikenbah.

A GOOD NAVEL ORANGE.

We have received from Mr. John Williams, proprietor of Sunnybank Nursery, Sunnybank, a sample of a navel orange which was originally raised by Mr. Dunning, of the Blackall Range, from a seed obtained by Mrs. Dunning from a navel orange grown by her father, Mr. George Butt, of Montville. It is a remarkably fine example of that excellent variety of citrus fruits—the Navel, and is well worthy of a prominent place in the Orchard. "The Dunning," as the fruit has been named, is a large, clear-skinned fruit, seedless, with firm, juicy flesh of excellent flavour. Mr. Williams is a specialist in citrus propagation, and growers may depend on obtaining trees true to name from his nursery.

THE BANANA AND ITS BY-PRODUCTS.

In addition to the sale of the fruit itself, there are numerous side lines which add considerably to the value of the returns per acre, which in themselves range from £40 an acre upwards; in fact, it is often stated in Natal that a return of over £100 per acre from a well cultivated plantation is not excessive. Amongst the side lines may be mentioned such things as banana figs (a delicious confection), banana flour, banana coffee, and banana fibre, while many people will be surprised to know that banana wine is reputed to be a very refreshing drink. A most excellent whisky is also made from the banana, and some samples of it exhibited at the St. Louis Exhibition, after analysis by the Department of Agriculture in Washington, were awarded the gold medal. It has this advantage over malt whisky, that it is ripe at the end of one year, whereas malt whisky requires to be kept in cask for several years.

There are many other side lines which might be taken up, and if worked on a scientific basis would result in the establishment of a very substantial industry. Drying bananas for the manufacture of flour and figs has been carried out in Jamaica and other countries for several years past. In many cases drying is done in the sun, but it has been found much more expedient to dry the banana artificially, for which purpose a very elaborate mechanical process is employed, the fruit being placed in a vacuum chamber capable of handling several hundredweight of bananas per day.

A very valuable manila hemp is produced from species of musa bananas, and in Java several thousands of acres are devoted to this plant, and the fibre is valued at anything from £25 per ton upwards. Some samples of fibre produced in East Africa, and reported on by the Imperial Institute, were stated to be readily saleable in the London market and probably worth about £50 per ton. [£62 to £67 in June, 1917.—Ed "Q.A.J."] It is not necessary, however, to cultivate the banana for fibre, as the wild variety seems to serve the purpose quite well.

In the West Indies, where banana growing has been brought to a high state of perfection, special vans are employed for transporting the products on the railway, and specially fitted steamers convey the fruit to the British market.—"Agriculture News," Durban, S.A.

Tropical Industries.

PROSPECTS OF PLANTATION RUBBER AS A FIELD FOR PERMANENT INVESTMENT.

In three successive issues of our Journal last year, viz., Nos. 3, 4, and 5 of the current volume, we discussed the Plantation Rubber Outlook solely as regards prices, production, stocks and consumption of the commodity. We note from papers recently to hand from London that great interest is revived in rubber shares which, for some time past, have not received the attention they deserved, and a valued correspondent's remarks, published in our last issue, emphasise this fact. Although in some quarters, rubber shares are still regarded as "dangerous speculative investments," the majority of investors regard the shares of well-selected companies as good as gilt-edged securities. We have frequently been told by pessimists that the rubber industry has not stood the test of time, and there is, no doubt, some truth in it. The past six years, 1911-16, witnessed the establishment of the industry on a sound basis, and the returns have been steady and regular, but to the overcautious the period of transition from its infancy in 1900 to sturdy manhood in 1916 is not this view, but there is another long enough. We do not share the view, but there is another factor which must also be taken into account before arriving at a decision as to the claims of writers that the rubber industry, for investment purposes, offers security with large profits such as it is difficult to match elsewhere. The factor we refer to is that of America as the largest consumer of the world's production of rubber. We are quite aware of the inter-dependence of the two countries, but it may perhaps some day occur to the United States to keep away from the plantation market on the score of price. This, however, can only be a temporary measure, but the effect on the share market will be more than temporary. We mention this merely to show how far ahead some people are inclined to look.

The present time therefore is, we think, quite opportune to give the views of a well-known member of the London Stock Exchange who has for years specialised in rubber shares, and we consider, therefore, is in a position to speak with true knowledge of the industry and the market. We are tempted to quote largely from this admirable brochure, which has been kindly placed at our disposal.

In considering the rubber planting industry as a field for investment, says the writer, it is desirable for purposes of comparison to establish some unit of measurement. What shall it be? The unit most generally adopted in rubber planting circles is the acre of rubber.

An acre of rubber in full bearing yields 400 lb. Well managed companies produce them at 1s. per lb. inclusive of all charges, so a

selling price of 2s. per lb. leaves a profit of 400 shillings or £20 per acre. If it be granted that the rubber planting industry should yield a return of 10 per cent. per annum to the investor, then (if we capitalise on that basis this income of £20 per acre per annum) an acre of mature rubber will fairly represent a capital value of £200, assuming a permanent selling price of 2s. If the price at which we purchase shares represents a purchase of mature rubber at less than £200 per acre, the return on our investment will be proportionately enhanced. Local conditions, of course, may vary. Choice estates will yield as much as 600 lb. at maturity, and poor ones only 200 lb., but assuming an average of 400 lb. an acre and 1s. per lb. profit on these figures £200 an acre represents rubber on a 10 per cent. basis.

Perhaps the easiest way to grasp the question of the unit is to ask the question—What does a share in a rubber planting company represent? Let us take a company of £100,000 in £1 shares owning 1,000 acres of mature rubber. Each acre of rubber obviously represents £100 of capital, so each £1 share represents a hundredth of an acre of rubber. A man holding one hundred shares may be regarded as the owner of an acre of rubber.

Now the price at which rubber estates have been planted out and brought to the mature stage varies in a remarkable degree. In times past instances can be found of experienced planters who have achieved this result at £20 per acre. To-day, on the other hand, if a group of ordinary investors were to come together to take up and plant out land they would probably find by the time their rubber was mature it would have cost them about £50 per acre.

The following table will show how great is the variation in capitalisation at par of different companies:—

£1 Shares.	Capitalisation per Acre at Par.
Bukit Rajah	£17
Kuala Lampur	41
Lanadron	57
Tali Ayer	79
Grand Central	90
Seaport	105

2s. Shares.	Capitalisation per Acre at Par.
Cicely	£13
Linggi	14
Vallambrosa	15
Bukit Mertajam	69
Kamuning	83
Sengat	108

Other things being equal, it is obvious that the company with the lowest capitalisation per acre will give the highest return. It is equally obvious that there will be a tendency in the market for the shares of

the various companies to attain prices at which the return to the investor will be the same whatever share he buys. But a tendency must not be mistaken for an accomplished fact. With many investors sentiment is as powerful a factor as reason. Investors do not always choose the share which is the cheapest, but frequently that which looks the cheapest to their uninformed judgment.

Suppose, for example, three companies of equal merit each owning 1,000 acres matured rubber. Let A be capitalised at £20 an acre, B at £40, and C at £100. The profit of all three companies (on our previous figures of £20 an acre) will be identical, or £20,000 per annum, but the return will be 100 per cent. on A, 50 per cent. on B, and 20 per cent. on C. Logically, measured by the 1,000 acres of rubber each company possesses, and by the earning capacity of that rubber, the prices at which the £1 shares of A and B ought to stand,—if C stand at par,—are, A, £5; B, £2; but logical considerations only weigh with some investors, and only partially weigh with others, so it will be found in practice that the share which ought to stand at £5 will very likely stand at £4, and the share which ought to stand at £2 will not stand higher than £1 15s., and the reason is that the £1 share at £1 looks cheaper than the others at £2 and £5 respectively, although in reality it is not.

The writer proceeds to discuss the question of profit thus:—

If the profits on rubber planting be permanent, rubber investments should, we have indicated, go to a 10 per cent. basis. This brings us to the question—Will the present rate of profits be maintained? Must not the return on rubber fall to an ordinary commercial profit?

This question cannot be answered by a simple "Yes" or "No." In theory the answer will be "Yes, ultimately." In practice it will be found that the rubber producing industry is a peculiar one, embracing factors that tend to postpone indefinitely the "ultimately" that they be at once conceded for the sake of argument. Theoretically, if rubber planting continue to yield a profit of 100 per cent., if rubber be produced at 1s. per lb. and sold at 2s., there will be such a rush of capital into the rubber-planting industry that the result must be a vast increase in production, and a fall in price, with a consequent reduction in profits to an ordinary commercial level. Now capital can be invested in the rubber planting industry either by the purchase of land and starting of new plantations, or by the purchase of shares in existing plantations. It costs to-day (as we have stated) £50 an acre to bring a rubber estate to the producing stage, and for five years the capitalist has to forego all return on his capital. If he can acquire an acre of five-year-old rubber for £100 by a purchase of rubber shares and obtain at once a return of 10 per cent., rising by the end of five years to 20 per cent., per annum, it is obviously a far superior investment to buy shares of existing companies than to go in for a new plantation. Therefore, unless and until rubber shares rise to a level of say £150 to £200 an acre, no vast rush of capital into the rubber-planting industry has to be contemplated.

The yield per acre is carefully discussed, and the writer quotes the figures given by Mr. Henry T. Brice in his interesting work in 1911 and repeated in 1914, showing the fair average yields in pounds per acre for rubber at various stages. Working on these figures the average of 211 lb. an acre all over is arrived at as regards the area planted from 1905 to 1911. Judged by the results of the year 1915 the figures of Mr. Brice are borne out remarkably. A similar calculation for the year 1920 is made out and an average of 385 lb. an acre all over is shown. The presumption is, since the figures in the first table are not continued beyond 10 years, that the increase in yield would be 50 lb. per acre every year up to 1920.

The other points touched on and ably discussed are the World's Production and the Growth of Demand. Regarding the latter, the following remarks are made as to America's needs:—

For the past five years the annual consumption of rubber has been allocated roughly one half to the United States and one half to the rest of the world. In 1911, the United States took over 46 per cent. By 1915 the proportion had grown to 61 per cent. It is, then, upon consumption in the United States that the future of the rubber industry chiefly hangs. The following table shows how consumption is growing:—

	Increases in World's Production in Tons.	Increases in United States Consumption.
1911	4,000 ..	2,000
1912	24,000 ..	15,000
1913	9,000 ..	Nil
1914	12,000 ..	10,000
1915	39,000 ..	35,500

The development of motor traction is largely responsible for this. His motor-car hitches the backwoods farmer on to civilisation. The dweller in remote districts soon discovers that his automobile is not a luxury but the best-paying investment he ever made, and it is the thing he cannot afford to give up when hard times compel all-round economy.

If demand in the United States continues to maintain its recent rate of growth (and there seems no valid reason why this should not be the case), then it must assuredly before long overtake the prospective supply.

The following summing up is worthy of repetition.

One closing remark by way of afterword. In uninformed circles it is argued that rubber investment cannot be sound because the return is so high. Now that "highest interest means low security" is a sound maxim, but it applies to borrowers. Planting companies are not borrowers in the sense of the proverb, but are associations of shareholders planting their own land with their own capital. Their investment is with Mother Nature, who rewards her children with no niggardly hand. Moreover, the rubber planting industry is reaping the just reward of virtue in respect of the sound financial basis upon

which the great bulk of the companies were formed. Promoters' profits were small, there is little or no watered capital to pay a return on, so it is natural, right, and just that shareholders should get a large return on their investments on rubber. The rubber market is as safe a one for investment to-day as any other industrial market in the Stock Exchange, and safer than most. It has no troubles to contend with from organised labour; climatic conditions affect it to but a trifling extent. Months of flood or drought involve simply a slight curtailment of crop. Demand for the staple article produced is persistent both in Peace and War, for it is a necessity of both. Synthetic bubble after synthetic bubble has been exploded until the present low cost of production of rubber itself is safeguard against even a genuine synthetic product, were one forthcoming. On all of these grounds, then, the rubber share market is bound to be recognised in the future as a great field for investment, and that of the soundest and most solid description. Either other industrial securities will have to fall in price till they yield as big a return as rubber, or rubber securities must rise till they yield as small a return as other industrial securities. There is no escape from this dilemma. Rubber shares will not continue permanently on a 10 to 15 per cent. basis.—The "Fiji Planters' Journal," May, 1917.

THE PRODUCTION OF GOOD SUGAR-BEET SEED.

From the "Louisiana Planter," 3rd February, 1917.

From an excellent article on the beet sugar industry, by Dr. F. S. Harris, Director of the Utah Agricultural Experiment Station, we take the following notes on the method of raising good beet seed:—

"With most kinds of crops seed can be taken from the ordinary commercial product; hence the getting of seed is a very simple matter. With sugar beets, on the other hand, good seed is obtainable only by a great amount of work carried on in a systematic manner.

"DIFFICULTIES OF SEED PRODUCTION.

"The commercial production of sugar beet seed is beset with many difficulties. Probably the greatest of these is the maintaining of a strain of beets with high sugar content and yield. The fact that the sugar beet has, in recent times, been bred up from a plant with comparatively low sugar content to its present high standard makes it somewhat unstable, and unless selection is continued deterioration occurs very rapidly.

"This continuous selection requires men who are familiar with the principles of breeding as well as men who have skill in making chemical analysis of the mother beets. Those who raise the mother beets and produce the seed must also be acquainted with the method of handling the crop. All of these special requirements delay the introduction of the beet seed industry into a new region. The time necessary to elapse from when selection is begun until the first seed is ready for market is so

great that investors hesitate to put their money into the business. Those who want quick returns are not willing to spend the time necessary to build up a business based on the sale of products of merit.

"The production of sugar beet seed therefore is not a business for the individual farmer with limited resources, but can best be done by a company with resources to build up a good substantial business wherein the profits will depend on the establishment of a reputation.

"GENERAL METHODS.

"The approved method of producing seed requires a number of years of selecting and testing in order to get a strain possessing the desired qualities. Seed is saved from tested beets of selected strains. This is called 'mother seed.' This mother seed is then planted, and the beets which are obtained used as mother beets to produce the commercial seed two years later. Roots only are produced the first year after seed is planted. These must be dug and stored over winter, and the second year they are set out and produce seed.

"The difficult part of the operation is the securing of suitable 'mother seed.' After this is obtained the individual farmer can raise the commercial seed.

"GETTING THE MOTHER SEED.

"The mother seed used in raising the mothers which produce the commercial seed is obtained only at considerable expense and after a number of years of work.

"The procedure usually carried out is about as follows:—The first year a great many beets of desirable size and shape are analysed for sugar. The better individuals are siloed, and the second year are planted and produce seed. The third year the seed from each beet is planted separately, and the resulting beets analysed. From this analysis it is possible to tell which of the original beets with a high sugar content are able to transmit to their progeny this necessary quality. The poor strains are discarded and the good ones siloed, to be used the fourth year in producing the mother seed. The mother seed is planted the fifth year, and the beets obtained from it produce the commercial seed the sixth year from the time the work was begun.

"It is not safe to use all individual beets that have a high sugar content without making a test to see if that quality is transmitted, since the high sugar content may be due to the conditions under which the beet grew and not to its intrinsic high quality. It is not the mother beet with high sugar content that is desired, but the mother whose

progeny will be high in sugar. In testing strains it is a good thing to have standard seed for comparison growing in different parts of the test field.

"In getting beets from which the commercial seed is produced, the roots are left considerably thicker in the rows than where regular beets are to be raised. About eight pounds of seed are used to the acre, and the plants are not thinned. This method is used in order to save land, and also to save labour in handling the beets. Less storage space is required for the small beets than for those of full size. Being small does not seem to reduce the amount of seed produced. These small beets are called ' steehlinge ' or ' fingerlings.'

"SILOING.

"One of the most important operations in connection with seed production is the storing over winter, or siloing, of the beets that are to be used the next year in raising seed. At the Utah Station quite a number of methods of siloing beets have been tested, and a number of these have given good satisfaction. The important things to be kept in mind are that the beets must not be allowed to dry out or to heat. There must be sufficient ventilation to allow the carbon dioxide produced by normal respiration to escape and at the same time not enough to dry the beets. The beets must have sufficient covering to prevent freezing, but not enough to cause heating.

"Beets stored in dry sand kept the best of any method which was tried, although this method is perhaps not practical except for the comparatively few mother beets that have been individually analysed and are more likely to decay on account of the wound caused when the core is removed for analysis.

"For the large number of beets used in producing the commercial seed, perhaps the best way is to silo them right in the field. This is done by piling the beets on top of the ground or in a shallow trench in ricks 5 or 6 feet wide, and then covering them with straw and soil or with soil alone. Only a light covering is given at first and more added as the weather gets colder.

"Ventilators should be placed in the ricks every few feet to allow carbon dioxide to escape and fresh air to enter. If a long rick is made, the beets should be divided every 12 or 15 feet by straw or earth, so that if decay begins at any point it will not destroy all the beets in the silo. Before planting the beets in the silo it is a good thing to remove the tops, leaving enough of the crown and tops so that growth will begin the next spring. If mother beets are allowed to wilt before they are planted, the yield of seed is greatly reduced.

"PLANTING.

"The mother beets can be planted considerably earlier in the spring than the beet seed, since the old beets are not so sensitive to frost as the young plants starting from the seed. It is probably needless to say that the land should have been ploughed deeply. Experiments with a number of methods of planting and distances between plants have been made and the following method adopted as a result:—

"The land is marked each way about 30 inches apart and a beet dropped at each crossing of the marks. The best distance apart will, of course, depend on conditions. A long spade is pushed into the ground and the beet put in behind the spade as it is moved forward. It is important to get the beets well below the surface of the soil. The crown should be covered with a small quantity of soil to protect the budding top. The rows being the same distance apart each way, the cultivator can be run in two directions and much hand labour saved.

"CARING FOR THE SEED CROP.

"Cultivation should be begun early in order to conserve moisture and prevent the weeds from starting. If proper cultivation is given at first, but little will be necessary later.

"The seed crop does not require many irrigations, but it is very important to have the soil moist during the time seed is forming. But little work is necessary between planting and harvesting aside from cultivation and one or two irrigations.

"HARVESTING AND THRESHING.

"Since the seed does not ripen evenly, it is necessary to go over the field and cut some of the plants before all are ripe. The ripening period may extend over a number of weeks. The cutting is done with a sickle, and the seed stocks piled in the field to dry before threshing. It usually pays to go over the field after harvest with a brush and dusting pan to glean seed that has fallen to the ground in cutting. Threshing can be done with a regular grain threshing machine, and from 15 to 20 tons of seed can be threshed in a day.

"CLEANING.

"After the seed is threshed there is always a certain amount of dirt and stems remaining. These are best removed by running the seed over a revolving canvas, which allows the seed to roll off, and at the same time carries the stems away. The dirt and chaff are removed with a fanning mill before the seed is run over the canvas."

NATIONAL HERBARIUM MELBOURNE OF VICTORIA

Entomology.

EXPERIMENTS IN POISONING CANE-GRUBS.

The following report has been received by the General Superintendent of Sugar Experiment Stations from the Assistant Entomologist to the Bureau (Mr. E. Jarvis) :—

Referring briefly to field experimentation with poison bait for cane-grubs, carried out lately at Innisfail and Meringa along the lines advocated in Bulletin No. 4 of this office, I may state that in the former locality a couple of acres were treated by Mr. F. L. Sugden, of "Johnstone River," but owing to the scarcity of grubs no damage to his crop was perceptible, either on this area or on immediately adjoining untreated cane land; so that the result of the experiment is left in doubt.

"One important point, however," writes Mr. Sugden, "appears to be definitely proved, that the application of even a heavier dose of Paris Green than you advised has had no injurious effect, but rather the reverse, on the growth of the crop."

The foliage of cane treated at Innisfail was noticed to be more luxuriant and of a darker green than that on the adjoining untreated area.

The above conclusion arrived at by Mr. Sugden verifies the author's opinion with respect to treated cane grown in pots at the laboratory last October. (Australian Sugar Journal, Vol. VIII., p. 741.)

Our half-acre plot at Mr. A. J. Draper's "Carrah" estate was treated with bait consisting of cowpea foliage dusted with copper arsenate.

The peas, which were sown on 25th January in trenches among cane planted last August, were duly poisoned and covered over on 14th February, the arsenical being applied at the rate of 24 lb. per acre.

Early in March the plantation on each side of this test plot—with the exception of a strip nine chains long containing a quarter of an acre adjoining its southern boundary, and about three acres on the northern edge of the 30-acre block—were treated by Mr. Draper with bisulphide of carbon.

At present the cane on our experiment plot is fully 8 feet high, and quite as flourishing as that growing on soil that was fumigated.

The untreated quarter acre appears to be suffering slightly, but owing to the foliage being over six feet in height, one can examine only the end of this strip, which is about 20 feet wide.

To form a correct opinion as to its condition it would be necessary to look down on it from above and compare the height and colour of the leaves with that of the cane on either side.

The three untreated acres on northern boundary, however, are already affected in places.

Presuming that grubs occurred early in the season over the entire area of this 30-acre block, we may, I think, reasonably conclude that arsenical poison-bait will destroy them just as effectively as fumigation with carbon-bisulphide.

The weather during the entire course of this experiment has been more or less showery, thus allowing affected plants to root afresh, and keep fairly green. In the event of normal dry conditions setting in we may expect to see more definite indications of grub attack on these plots at Meringa.

It will be interesting later on, when harvesting the cane, to determine the weight of yields per acre on treated and untreated areas.

THE QUEENSLAND GIANT RAT.

MOUSE.—

Yes. Mr. H. A. Longman (Queensland Museum), in his "Notes on the Classification of common Rodents," from which the illustrations of rats and mice in the June issue of this Journal were taken, mentions "The Giant Queensland Rat" (*Uromys macropus*), which is found in North-eastern Australia. There are seven specimens of this rat in the Queensland Museum from the Cardwell district. *Uromys banfieldi*, De Vis, from Dunk Island, north-east of Cardwell, is remarkable for the length of its teats. The *Uromys macropus* (big foot) measures over 12 inches over head and body, and the tail is about the same length. Its limbs are robust; the hind feet large, giving rise to the specific name *macropus* (big foot); the nails are large and broad at the base. The general colour above is greyish-brown tinged with reddish, with coarse black-tipped hairs intermixed; white below; whiskers very long, stiff and black; feet white; tail black on the basal, and white or pale-yellow on the apical half. It is said to be not uncommon in hollow trees in the plains, but Krefft stated that the animal frequented rocks more than trees, so that its habitat seems to be variable. Our illustration is taken by permission from Mr. Longland's work above mentioned.

PLATE 7.—THE QUEENSLAND GIANT RAT.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, Acting Government Botanist.

No. 10.

SIDA CORDIFOLIA, *Linn.*

Description.—A rather coarse branching undershrub, more or less clothed with a soft stellate tomentum of velvety hairs. Leaves rather long-stalked broadly cordate (heart-shaped) or almost orbicular, or rarely ovate, mostly 1-1½ in. diameter, rarely more, usually soft and thick. Flowers yellow on short axillary pedicels (flower-stalks) or clustered into short leafy racemes. Calyx softly tomentose, carpels about 10 together or sometimes fewer, opening at the top in two valves and terminating in rather long awns.

Distribution.—A native of tropical Australia, and a common weed widely spread throughout the tropics of the whole world. It is a great pest around some of the towns and townships of Northern Queensland, and during the past couple of years has appeared in the neighbourhood of Brisbane and some other Southern localities.

Common Name.—Though an abundant weed, I know of no vernacular applied to it; the botanical one—*Sida cordifolia*—is short, euphonious, and distinctive.

Uses.—It is generally left untouched by stock; though quite wholesome the hairy nature of its leaves and the fibrous nature of the stems make it of very slight value as a fodder. Like other species of the genus it is held among the Hindus and other Asiatics to possess considerable medicinal virtues, the only one of any value probably being the use of its mucilage mixed with rice in cases of dysentery.

Eradication.—In small areas hand pulling is the most effective method; in larger areas cutting off below the surface of the soil or where the land is not wanted for some little time and the plants are growing thickly together spraying with any of the commercial weed-killing preparations should prove successful. The plants should be dealt with, of course, prior to seeding.

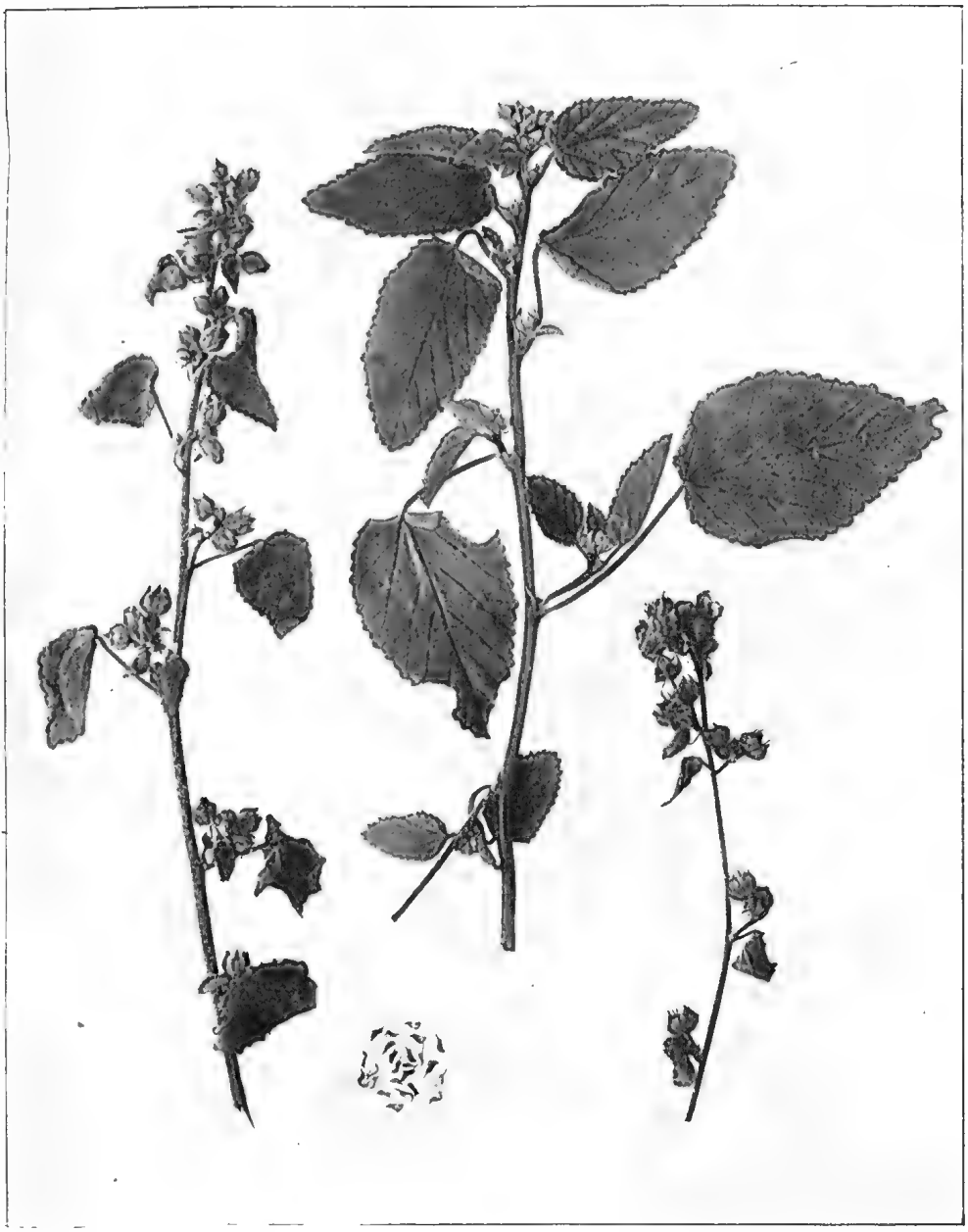


Plate 8.—Sida Cordifolia, *Linn.*

General Notes.

PLANTATION LIFE IN MEXICO.

Perhaps a perusal of the following account of the difficulties of sugar-planters in Mexico, republished from the "Louisiana Planter," in the "Queensland Sugar Journal," will give us pause, when we grumble over conditions in the agriculture world of Queensland, and tend to make us thankful that we, in spite of sundry labour difficulties, which periodically crop up, still live in a free country, and where no brigands can perform here as do the Mexican bandits.

It appears that having to their own satisfaction established the fact that Mexico is a country with soil and climate admirably adapted to the growth of sugar cane, some Americans formed a company with a capital of something over a million sterling, and up-to-date machinery was installed. An area of some 3,376 acres was planted, and the annual crop is said to have been at the rate of about 5 tons of sugar per acre. The outlook was most promising, until the revolution in 1911-12. Since then, as a contemporary remarks, "the plantation has not come to its own." In 1915, for example, the work was interrupted by bandits, and when the rainy season set in, 500 acres of the crop remained uncut. For three or four years, the bandits have done as they pleased. Labour was hard to obtain, because so many of the Mexicans delight in the life of adventure that hunts spoils, fights, and loves ease. These bandits came to the manager of the company, and demanded and obtained tribute of 2,000 dollars. Somewhat later another two thousand was taken, and this was followed by a third demand for the same sum, all of which was paid. Then they took possession of the plantation houses, robbing the company of merchandise, blankets, bedding and clothes. The place seemed to suit them in every way, and they made their headquarters at the mill for several weeks, so that all the operations of the factory ceased. Nearly ten thousand dollars were stolen in this way. Then, in August, 1915, Mr. Edward Wells, an American, who had been engaged as auditor, was brutally murdered and robbed of over eleven thousand dollars belonging to the company, which he was bringing to the head office. As all the employees of the company had been disarmed, there was no resistance. The company appealed to the State Department at Washington, with the result that might have been expected in view of all that has happened in Mexico. The bandits certainly were in no way perturbed as to the risk of punishment, for somewhat later they held up the boats engaged in bringing oil to the factory, with other raw material, and serious delay was the result. Still the company pushed ahead, and after surmounting tremendous difficulties they started crushing with about half their usual force.

No sooner had the factory started than the Government labour inspector arrived. These inspectors are employed by the military governor, and their word is law. They can even employ the military to enforce their demands. Their only compensation is derived from a portion of the fines they inflict. The inspector persuaded the labourers to leave the service of the company, though their wages at the time were double what the Government was paying. He preached anarchy, and caused old and previously faithful employees to leave. Work was suspended; everything that was moveable was taken away, and from 5,000 to 10,000 acres of cane were fired. As soon as the inspector had left, the manager and his workers were cited to appear before the local authorities on a charge of violating the labour laws, and five fines of £40 each were inflicted. The company was subjected to further impositions and injustices, and the labourers were so outraged that only the most faithful of them remained.

In spite of all this, crushing was carried on, and according to their annual report, the company had 13,200 bags of raw and centrifugal sugar ready for export. But the bandits now control the river bank, and threaten to sink any ship and shoot the crew, so no one ventures out. With the invasion of the American troops, the situation was only aggravated.

The company had even a cattle embargo to make things worse; for though they had 500 head at one of their stations, the governor, in view of military depredations committed every week, refused to allow the cattle to be shipped.

Industrially the country is paralysed; but it is hoped, we are told, that soon there will be a restoration of peace and prosperity.

WHEN THE CLOCK STOPS.

A clock will often stop without any apparent cause. In such a case it is probable that the works are choked up with dust. The remedy is to place in it a small piece of cotton waste soaked in kerosine, and leave it there for several hours. The fumes of the kerosine will loosen the dirt, and if dirt is the cause of the stoppage, the clock will go on as well as ever.

WATERMELON KOMFYT.

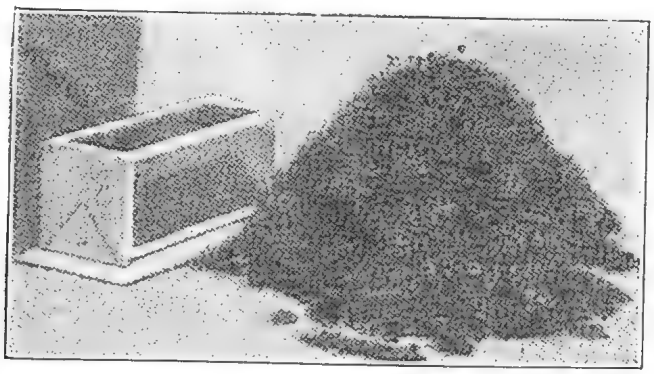
Take the skins (thick) of one small watermelon, peel the green part off and prick with a fork. Then lay in clean water (to which a dessert-spoonful of lime has been added) over night. Next morning wash off and boil up in clean water, then drain and add ¾ lb. of sugar to 1 lb. skins, and cover with clean cold water. Boil till clear and tender. A few pieces of bruised ginger added will improve the flavour. This is a delicious preserve.

A GOOD FLY-TRAP.

In a month or two—just so soon as spring puts in an appearance—the stable fly will be with us again. The fly is man's filthiest enemy and is responsible for more disease than we know. The gastric troubles from which youngsters suffer—probably, infantile paralysis—are due to the fly.

Wouldn't you like to do without the fly?

Mr. J. R. McKee says you can. He has invented a trap which, he says, works like a charm. He holds no patents because he wants every home to get rid of flies. He put some of these traps near the kitchen and the stables and caught a million. Here they are in the picture:

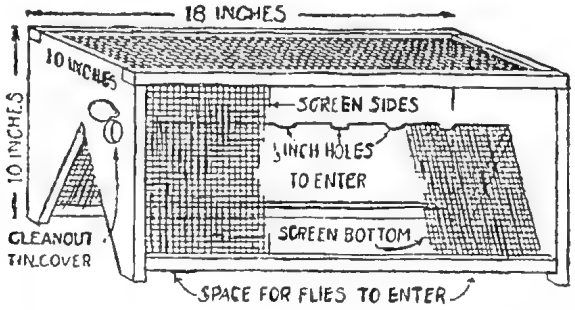


You don't want to count them; in fact, you wouldn't touch the heap of death-dealing, germ-laden filth if you could. The "million" is not a guess but a careful estimate, based on the counting of the dead flies in several small batches, and weighing each batch on accurate scales; then the batches were put together until they were approximately the million shown in the photographic evidence. A batch averaged 6,000 dead flies to the ounce, and each fly was provided with six legs, making a total of 36,000 feet to the ounce, every one a spongy receptacle for receiving and transferring millions of germs!

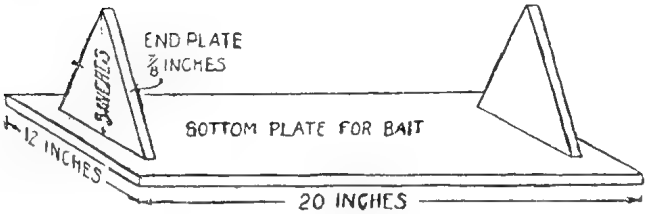
These flies were caught in the early part of the summer in the traps placed about the grounds, particularly between the house and the stables, but none of them were in the house or on the verandas. The usual fly delicacies were used for bait and included sugar, molasses, and fish bones. The open-air dining spaces were not the only places benefited, but the kitchens, pantries, and even the stables themselves.

The trap may be made any size, as the principle is the same and based on the fact that a fly will always crawl or fly upwards in its efforts to escape from an enclosure. As is shown in the detail drawing, the fly crawls under the wire-netting on to the baseboard, painted white

as an added lure, where the bait is placed. The fly find itself under an inverted V-shaped piece of screening, with half a dozen small holes along the top. It crawls up to the sides of the trap or flies to the top till it finds one of the holes, through which it goes into the trap proper,



This is the Fly Trap Which Was Found So Effective



which is simply a rectangle placed over the V and above the bait, and there his doom is sealed, for, though ingress is easy, egress is impossible.

The women of the country are the ones to carry on this work, and through them the children's aid should be enlisted.

Let us get into this fly-killing business, Queenslanders!—Farm Bulletin.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JULY, 1917.

Article.		JULY. Prices.
Bacon	lb.	9d. to 1s.
Barley	bush.	2s. to 2s. 6d.
Bran	ton	£5 15s.
Broom Millet	„	£32
Butter	cwt.	158s. 8d.
Chaff, Mixed	ton	£3
Chaff, Oaten	„	£6 to £6 10s.
Chaff, Lucerne	„	£6 to £7
Chaff, Wheaten	„	£4 to £5 10s.
Cheese	lb.	9d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	...
Hay, Lucerne	„	£4 15s.
Honey	lb.	4d. to 4½d.
Maize	bush.	2s. 7d. to 2s. 8d.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£7 to £8
Peanuts	lb.	3d.
Pollard	ton	£7 2s. 6d.
Potatoes	„	£5 10s. to £6 10s.
Potatoes (Sweet)	cwt.	3s.
Pumpkins (Cattle)	ton	£1 to £2
Eggs	doz.	1s. 7d. to 1s. 9d.
Fowls	per pair	3s. to 6s.
Ducks, English	„	3s. 6d. to 4s.
Ducks, Muscovy	„	4s. 6d. to 8s.
Geese	„	6s. to 7s.
Turkeys (Hens)	„	9s 9d.
Turkeys (Gobblers)	„	12s. 6d.
Wheat	bush.	3s. 7d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	3s. to 6s.
Cauliflowers, per dozen	6s. to 10s.
Celery, per bundle	..
Beans, per sugar bag	7s. to 12s.
Peas, per sugar bag	7s. to 13s.
Carrots, per dozen bunches	10d. to 1s.
Chocos, per quarter-case	2s. to 2s. 6d.
Beetroot, per dozen bunches	8d. to 9d.
Lettuce, per dozen	1s. to 2s.
Marrows, per sack	5s. to 5s. 6d.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per sugar bag	1s. 6d.
Table Pumpkins, per dozen	1s. 6d. to 2s. 4d.
Tomatoes, per quarter-case	2s. to 5s.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	JULY. Prices.
Bananas (Queensland), per case	8s. to 10s.
Bananas (Tweed River), per case	8s. to 13s.
Bananas (Fiji), per case	4s. 6d. to 6s.
Bananas (G.M.), per bunch	5s. 6d. to 7s.
Bananas (G.M.), per case	16s. 6d. to 18s. 6d.
Custard Apples, per twelve to fifteen tray	...
Guavas, per case	2s. to 4s.
Lemons (Local), per bushel-case	2s. 6d. to 3s.
Mandarins, per case	2s. to 6s.
Oranges (Navel), per case	8s. to 12s.
Oranges (other), per case	2s. to 5s. 6d.
Papaw Apples, per half-bushel-case	1s. 6d. to 2s.
Passion Fruit, per half-case	4s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	6s. to 10s.
Pineapples (Ripleys), per double-case	6s. to 7s.
Pineapples (Common) per double-case	6s. to 7s.
Tomatoes (Queensland), per half-bushel-case	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JULY. Prices.
Apples, Eating, per bushel case	12s. 6d. to 14s.
Apples, Cooking, per bushel case	12s. to 14s.
Bananas (Cavendish), per dozen	1¼d. to 4d.
Bananas (Sugar), per dozen	2d. to 4½d.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. to 3s. 6d.
Custard Apples, per quarter-case	5s. to 7s.
Granadillas, per quarter-case	...
Grapes, per lb.	...
Lemons (Lisbon), per quarter-case	3s. to 6s.
Limes, per quarter-case	...
Mandarins, per quarter-case	3s. to 8s,
Oranges (Navel), per case	9s. to 10s.
Oranges (Seville), per hundredweight	11s.
Oranges (other), per hundredweight	2s. to 4s. 6d.
Papaw Apples, per quarter-case	1s. 3d. to 2s.
Passion Fruit, per quarter-case	4s. 6d. to 5s.
Pears, per quarter-case	8s. to 10s.
Peanuts, per lb.	3d.
Persimmons, per quarter-case	...
Pineapples (Ripleys), per dozen	6d. to 2s. 6d.
Pineapples (Rough), per dozen	6d. to 2s. 6d.
Pineapples (Smooth), per dozen	1s. to 2s. 6d.
Pomeloes, per hundredweight	...
Quinces, per quarter-case	...
Rosellas, per sugar bag	...
Strawberries, per dozen boxes	5s. to 9s.
Tomatoes, per quarter-case	2s. to 5s. 3d.

TOP PRICES, ENOGGERA YARDS, JUNE, 1917.

Animal.	JUNE. Prices.
Bullocks	£19 12s. 6d. to £26
Cows	£11 5s. to £15 2s. 6d.
Cows (Single)	£18 2s. 6d.
Merino Wethers	43s.
Crossbred Wethers	45s.
Merino Ewes	31s. 6d.
Crossbred Ewes	44s. 6d.
Lambs	38s.
Pigs (Porkers)	55s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE, 1917, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of Years' Records.	June, 1917.	June, 1916.		June.	No. of Years' Records.	June, 1917.	June, 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	1·85	15	0·51	0·51	Nambour	3·59	20	0·27	2·57
Cairns	2·92	34	0·38	2·21	Nanango	2·00	34	0·09	2·37
Cardwell	2·13	44	0·36	1·00	Rockhampton	2·12	29	0·16	1·80
Cooktown	2·10	40	0·30	1·47	Woodford	2·71	29	0·48	2·24
Herberton	1·04	29	0·30	0·30					
Ingham	2·53	24	0·48	1·88	*Darling Downs.*				
Innisfail	7·27	35	4·23	3·39					
Mossman	1·41	4	0·79	1·45	Dalby	1·65	46	0·62	2·80
Townsville	1·39	45	0·07	0·26	Emu Vale	1·44	20	0·25	1·72
					Jimbour	1·65	28	0·59	2·45
Central Coast.					Miles	1·99	31	0·25	2·95
					Stanthorpe	1·79	43	0·70	3·13
Ayr	1·44	29	0·42	0·11	Toowoomba	2·35	44	0·60	3·52
Bowen	1·69	45	0·61	0·33	Warwick	1·67	29	0·31	2·01
Charters Towers	1·52	34	0·04	0·16					
Mackay	2·80	45	0·54	1·81	*Maranoa.*				
Proserpine	4·31	13	1·16	1·56					
St. Lawrence	2·60	45	0·40	0·92	Roma	1·68	42	0·34	3·11
South Coast.					*State Farms, &c.*				
Biggenden	1·99	17	0·07	2·54					
Bundaberg	2·89	33	0·04	3·33	Bungeworgorai	1·72	5	0·40	3·07
Brisbane	2·63	66	0·21	2·79	Gatton College	1·72	17	0·16	1·95
Childers	2·36	21	Nil	2·73	Gindie	1·67	17	0·49	1·29
Crohamhurst	4·13	25	0·58	3·06	Hermitage	2·07	10	0·40	1·95
Esk	2·05	29	0·27	2·36	Kairi	0·88	5	0·23	0·34
Gayndah	1·87	45	0·05	2·21	Kamerunga	2·72	26	0·35	0·95
Gympie	2·58	46	0·56	1·86	Sugar Experiment Station, Mackay	2·55	19	0·64	2·10
Glasshouse M'tains	4·52	8	0·70	2·88	Warren	1·97	5	Nil	1·82
Kilkivan	2·03	37	Nil	1·96					
Maryborough	2·93	45	0·27	3·14					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·32	4·59	6·40	5·4	6·30	5·18
2	6·13	5·16	6·32	4·59	6·40	5·4	6·30	5·18
3	6·14	5·15	6·33	4·59	6·40	5·4	6·29	5·19
4	6·15	5·14	6·33	4·59	6·40	5·5	6·29	5·19
5	6·15	5·14	6·33	4·59	6·40	5·5	6·28	5·20
6	6·16	5·13	6·34	4·59	6·40	5·5	6·28	5·20
7	6·15	5·12	6·34	4·59	6·40	5·6	6·27	5·21
8	6·17	5·12	6·34	4·59	6·40	5·6	6·26	5·21
9	6·17	5·11	6·35	4 59	6·40	5·6	6 25	5 22
10	6·18	5·11	6·35	4·59	6 39	5·7	6·24	5·22
11	6·19	5·10	6·35	5·0	6·39	5·7	6 23	5·23
12	6·20	5·9	6·36	5·0	6·39	5·8	6 22	5·23
13	6·21	5·9	6·36	5·0	6·39	5·8	6 21	5 24
14	6·21	5·8	6·36	5·0	6·39	5·9	6·20	5·24
15	6·22	5·8	6·36	5·0	6·38	5·9	6·19	5·25
16	6·23	5·7	6·37	5·0	6·38	5·10	6·18	5·25
17	6·23	5·7	6·37	5·0	6·38	5·10	6·17	5·26
18	6·24	5·6	6·37	5·0	6·37	5·11	6·16	5·27
19	6·24	5·6	6·37	5·0	6·37	5·11	6·15	5·27
20	6·25	5·5	6·38	5·0	6·36	5·12	6·14	5·28
21	6·25	5·5	6·38	5·1	6·36	5·12	6·13	5·28
22	6·26	5·4	6·38	5·1	6·35	5·13	6·12	5·29
23	6·27	5·3	6·38	5·1	6·35	5·13	6·11	5·29
24	6·27	5·3	6·38	5·1	6·34	5·14	6·10	5·30
25	6·28	5·2	6·39	5·2	6·34	5·14	6·9	5·30
26	6·29	5·2	6·39	5·2	6·33	5·15	6·8	5·31
27	6·29	5·1	6·39	5·2	6·33	5·15	6·7	5·31
28	6·30	5·1	6·39	5·3	6·32	5·16	6·6	5·32
29	6·30	5·0	6·39	5·3	6·32	5·16	6·5	5·32
30	6·31	5·0	6·39	5·3	6·31	5·17	6·4	5·33
31	6·31	4·59	...	...	6·31	5·17	6·3	6·33

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
7 May	○	Full Moon	12	43	p.m.
14 „	☽	Last Quarter	11	48	a.m.
21 „	●	New Moon	10	47	„
29 „	☾	First Quarter	9	33	„

The Moon will be nearest the earth on the 14th, and at its farthest distance on the 28th.

5 June	○	Full Moon	11	7	p.m.
12 „	☽	Last Quarter	4	38	„
19 „	●	New Moon	11	2	„
28 „	☾	First Quarter	2	8	a.m.

The Moon will be nearest the earth on the 9th, and at its farthest distance on the 25th. It will cause a partial Eclipse of the Sun on the 19th, visible in the Arctic Regions but not in Australia.

5 July	○	Full Moon	7	40	a.m.
11 „	☽	Last Quarter	10	12	p.m.
19 „	●	New Moon	1	0	„
27 „	☾	First Quarter	4	40	„

The moon will be nearest the earth on the 7th, and at its greatest distance on the 22nd. There will be a *Total Eclipse* of the *Moon* from 6·51 to 8·27 a.m. on the 5th; but only the moon's entrance into the shadow of the earth will be seen in Eastern Australia.

3 Aug.	○	Full Moon	3	11	p.m.
10 „	☽	Last Quarter	5	56	a.m.
18 „	●	New Moon	4	21	„
26 „	☾	First Quarter	5	8	„

The moon will be nearest the earth on the 4th, and at its greatest distance on the 18th.

* For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reprodnced without acknowledgment.]

* These notes will not again be published until September, as they apply to the series from May to August.

Farm and Garden Notes for September.

FIELD.—Spring has now arrived, and with it there will be the usual trouble with weeds, especially on carelessly prepared ground. Therefore, the cultivator and the horse and hand hoe must be kept vigorously at work to check the weed pests and save the growing crops as well as much future labour. Attend to earthing up any crop which may require it. There may possibly occur drying winds, dry weather, and even very late frosts, which have not been unknown in parts of this State even as late as September. Still, good showers may be looked for in October, and much useful work may be done during the present month which will go far to afford a fair prospect of a good return for labour. Plant out *Agave rigida*, var. Sisalana (sisal hemp plant), in rows 6 to 8 ft. apart, according to the richness of the soil. All dry places on the farm, too rocky or too poor for any ordinary crops, should be planted with this valuable aloe. Especially should limestone country be selected for the purpose. If the soil is very poor, and the plants very small, it is better to put the latter out into a nursery of good soil, about 1 ft. apart. Next year they will be good-sized plants. Keep down tall weeds in the plantation, and do not allow couch or buffalo grass to grow about the roots. Sisal will do no good if planted on low-lying wet land, or on a pure sandy soil. It thrives best where there is plenty of lime, potash, and phosphoric acid, all of which (except potash, unobtainable under present war conditions) can be cheaply supplied if wanting in the soil. Sisal requires so little labour from planting to maturity that it can be grown to good profit despite the high cost of white labour. The price of the fibre now ranges from £70 to £95 per ton for British East African, the Mexican being unobtainable. Sow cotton—Sea Island near the coast, and Uplands generally. Caravonica succeeds best in North Queensland. Sow maize, sorghum, imphee, mazzagua, Indian cane, prairie grass, Rhodes grass and paspalum, panicum, tobacco, pumpkins, and melons. Sugar-cane planting should be vigorously carried on. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, ginger, and canaigre, the latter a tuber yielding a valuable tanning substance. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled

by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft. apart. Plant out tomatoes 3½ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

FLOWER GARDEN.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur, notwithstanding the increasing temperature. Be careful that the bulbs do not come in contact with fresh manure. Keep a good lookout for slugs. Plant out chrysanthemums, palms, and all kinds of tropical and semi-tropical plants. If hot weather should ensue after planting, water and shade must be given. Sow dianthus, snapdragon, and coleus, seed or cuttings of the latter. Roses will now be in full bloom. Keep them free from aphis, and cut off all spent blooms. This latter work should be done in the case of all flowers. If you wish to save seeds, do not wait for the very last blooms, but allow some of the very best to go to seed. If you have any toads in the garden or bush-house, encourage them to take up their abode there. They are perfectly harmless, in spite of their ugliness, and they destroy an astonishing number of insects injurious to plants. Fill up all vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, cockscomb, balsam, sunflower, marigold, cosmos, summer chrysanthemum, coreopsis, portulaca, mesembryanthemum, calendula, &c.

Orchard Notes for September.

THE SOUTHERN COAST DISTRICTS.

The marketing of citrus fruits, in the later districts, of the late winter or early spring crop of pines and bananas, also of strawberries and Cape gooseberries, will continue to occupy the attention of fruitgrowers. We can only repeat the advice we have so often given in these Notes respecting the marketing of all kinds of fruit—viz., to grade the fruit evenly, pack honestly, and display it to the best advantage if you want to get good returns.

September is a very important month to the fruitgrower, owing to the fact that it is usually a dry month, and that it is essential in all cases to keep the land in a high state of tilth, so as to retain the moisture that is required by the various trees that are in blossom, thus securing a good set of fruit. Where irrigation is available, it is advisable to give the trees a good watering should the ground be dry, as this will induce a good growth and cause the fruit to set well. If an irrigation is given, it should be a thorough one, not a mere surface watering, and once the land is saturated the moisture must be retained in the soil by constant and systematic cultivation. If this is done, one good watering will usually be enough to carry the trees through in good condition to the thunderstorms that come later or even to the summer rains, if the soil is of a deep sandy loamy nature.

No weeds must be allowed in the orchard or vineyard at this time of the year, as they are robbing the trees and plants of both the water and plant food that are so essential to them at this period of their growth.

There is not much to be done in the way of fighting scale insects during the month, as they are more effectually dealt with later on; but where young trees are showing signs of distress, owing to the presence of scale insects, they should be treated, the gas method being the most efficacious.

Beetles and other leaf-eating insects often make their appearance during the month. The best remedy is to spray the trees or plants with one or other of the arsenical washes that are recommended by me in this Journal. The vineyard will require considerable attention. Not only must it be kept well worked, but any vines that are subject to the attack of black spot must be sprayed from time to time with Bordeaux mixture. Disbudding must be carefully carried out, as this work is equally as important as the winter pruning, as it is the best means of controlling the future shape of the vine. A very common fault with vines grown in the coast districts is that the buds often remain dormant, only the terminal bud and possibly one other starting into growth, thus leaving a long bare space on the main rods, which is undesirable. When this takes place, pinch back those shoots that have started, and which are taking the whole of the sap, and force the sap into the dormant buds, thus starting them into growth. This will result in an even growth of wood all over the vine—not a huge cane in one part and either a stunted growth or dormant buds on the rest.

Every care should be taken during the month to prevent the fruit-fly from getting an early start. All infested oranges, loquats, kumquats, or other fruits should be gathered and destroyed, as the keeping in check of the early spring crop of flies, when there are only comparatively few to deal with, will materially lessen the subsequent crops. Land that is to be planted to pines or bananas should be got ready now, though the planting need not be done till October, November, or even later. Prepare the land thoroughly; don't scratch the surface to the depth of a few inches, but plough as deeply as you have good surface soil, and break up the subsoil as deeply as you can possibly get power to do it. You will find that the extra money expended will be a profitable investment, as it will pay every time.

THE TROPICAL COAST DISTRICTS.

September is usually a very dry month, and fruit trees of all kinds suffer in consequence. The spring crop of citrus fruits should be harvested by the end of the month, as, if allowed to hang later, there is a great risk of loss by fly. The fruit should be well sweated, and, if carefully selected, well-graded, and well packed, it should carry well to, and fetch high prices in, the Southern States, as there are no oranges or mandarins grown in Australia that can excel the flavour of the best of the Bowen, Cardwell, Cairns, Port Douglas, or Cooktown fruit.

As soon as the fruit is gathered, the trees should be pruned and sprayed with the lime and sulphur wash, as this wash is not only a good insecticide, but it will keep down the growth of all lichens, mosses, &c., to which the trees are very subject.

Every care should be taken to keep down the crop of fruit-fly during the month. All infested fruit should be gathered and destroyed, particularly that in or adjacent to banana plantations. Watch the

banana gardens carefully, and keep well cultivated. New land should be got ready for planting, and where land is ready planting can take place.

Papaws and granadillas are in good condition now, and, if carefully gathered and well packed in cases only holding one layer of fruit, they should carry well to the Southern markets if sent in the cool chamber.

THE SOUTHERN AND CENTRAL TABLELANDS.

Prune grape vines at Stanthorpe in the early part of the month, leaving the pruning as late as possible, as the object is to keep the vines back in order to escape damage from late spring frosts. All vines subject to the attack of black spot should be treated with the winter dressing when the buds are swelling; this treatment to be followed by spraying with Bordeaux mixture later on.

Where fruit trees have not received their winter spraying, they should be treated at once before they come out into flower or young growth. Where the orchard or vineyard has not been ploughed, do so, taking care to work the land down fine as soon as it is ploughed, so as to keep the moisture in the soil, as the spring is always the trying time for fruit trees.

Look out for fruit-fly in the late oranges and loquats in the Toowoomba district. Keep the orchards and vineyards well cultivated; disbud the vines when sufficiently advanced. Spray for codlin moth.

In the Central tablelands irrigate vines and fruit trees, and follow the irrigation with deep, constant, and systematic cultivation. Keep down all weed growth, and fight the red scale on citrus trees with cyanide. The objective of the fruitgrowers throughout Queensland during September and the following months is, "How best to keep the moisture in the soil that is required by the trees, vines, plants, and vegetables"; and this objective can only be obtained by irrigation where same is available, or by deep, systematic, and constant cultivation where there is no water available for irrigation.

We have received from Mr. A. E. Stephens, F.C.S., Director for Australia of the Chilian Nitrate of Soda Propaganda, the following comment on our article on "Fertilisers and the Value of Potash in Agriculture," by Dr. Voelcker. We feel sure that farmers and all others engaged in agriculture and market gardening will read the article with much interest, and also act on it.

FERTILISERS IN WAR TIME—NITRATE OF SODA.

The extracts quoted in the July issue from Dr. Voelcker's paper, "Fertilisers and their Supply in War Time," which he read at the meeting of the Royal Society of Arts in London last March, are hardly applicable to Australia.

Dr. Voelcker's remarks applied essentially to conditions prevailing in Great Britain during war time.

In Australia at the present time nitrate of soda is more easily procurable and considerably cheaper per ton than sulphate of ammonia.

During the last twelve months over 9,000 tons of nitrate of soda have been imported into Australia, and although the price is £5 or £6 higher per ton—which is due to a corresponding increase in the shipping freights—than it was before the war, it can now be procured from all manure merchants at prices ranging from £19 to £21 per ton. The imports for the previous year were about 5,000 tons.

Sulphate of Ammonia is procurable only in limited quantities at prices varying from £25 to £28 per ton.

Comparing the utility of the two nitrogenous fertilisers in those localities where nitrogen is more or less a necessity, the conditions in Australia are again almost exactly the reverse of those in England.

Owing to the prevailing deficiency of lime in a great portion of our Australian soils the use of a nitrogenous fertiliser which has an alkaline base, like nitrate of soda, is to be preferred to an acid salt, like sulphate of ammonia, which latter makes great demands on the lime contents of the soil.

In Queensland, where it has been tried on sugar cane, nitrate of soda has already proved its immense crop increasing capabilities, and used correctly probably no other individual fertiliser can produce such striking increases in yield. For fruit and vegetable crops and maize the results in most cases also demonstrate the value of nitrate of soda.

Much more could be said of the merits of nitrate of soda over sulphate of ammonia, although the latter generally gets preference from manure manufacturers owing to its being better suited for incorporating in mixtures, the main base of which is superphosphate.

In the present unavoidable absence of potash manure, the property which nitrate of soda possesses in liberating otherwise insoluble potash which may exist in the soil should not be overlooked—a property which is not possessed by sulphate of ammonia.

It is only owing to the shortage of tonnage and the fact that practically the whole of the nitrate of soda now being imported into Great Britain is being requisitioned by the British Government for munition making purposes, that the different agricultural chemists and officials in Great Britain are trying to induce farmers there to use sulphate of ammonia instead of the invariably more favoured nitrate of soda for the purpose of manuring their crops—a state of affairs which has already been said does not at present apply to Australia, as your article in the July issue might possibly lead many people to believe.

Although the prices of fertilisers are generally higher all round than in pre-war time, it is practically only potash manures and basic slag that are unprocurable now in Australia.

Strong efforts are being made to discover some means of producing potash in Australia itself, and the manufacture of *basic*-superphosphate provides an even better substitute for basic slag.

The following is a list of the manures, other than proprietary mixtures, which are available:—

Phosphatic Manures.—Superphosphate, basic superphosphate.

Phosphatic and Nitrogenous Manures.—Bone dust, meat works fertilisers, blood and bone.

Nitrogenous Manures.—Nitrate of soda, sulphate of ammonia, dried blood.

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MELBOURNE VICTORIA

Agriculture.

CULTIVATING THE COTTON CROP.

The cultivation of cotton after the crop has been properly planted and is up to a good stand is a very simple matter. The methods followed and the implements used in doing the work are unimportant, provided care is taken to keep the soil in best condition for the rapid growth of the plants. Some of the conditions that are important in the growing of cotton under boll-weevil conditions are the following:—

The highest temperature possible under existing weather conditions, good drainage, and keeping the cotton free from grass at every stage of its growth.

In order to maintain the best temperature and drainage it is necessary to plant the cotton on a bed and to keep this ridge up to a moderate height until as late as the middle or last of September. Late in the season flat cultivation can be given the crop. One very satisfactory method of cultivation to follow is to run a side-harrow around the cotton as soon as it is out of the ground. This will break any crust that may have formed on the soil, leave a good mulch of dirt around the little plants, and destroy all grass or weeds that may have come up. The side-harrow will have a tendency to flatten the beds and the middle should be ploughed out with a middle-breaker at once to guard against wet weather. This cultivation may be followed with a side-harrow and middle-breaker again, and it is not a bad plan to continue this until the middle of the growing season. Later a double-shovel or double cultivators may be substituted for the side-harrow and middle-breaker, using a small sweep next to the cotton

and a large one out in the middle. After the middle of September or October, or when the cotton is getting up to a fruiting stage, begin to practise flat cultivation with some form of diverse cultivator.

It is very important never to allow the soil to become hard or crusty. This may be accomplished by frequent cultivation and by always keeping two or three inches of loose dirt over the surface of the ground. Cotton should be ploughed every ten days. Once a week would be better. The width of the cotton rows should not be less than three feet on any land. A very good plan to follow in spacing rows is to give about the same width that the cotton will grow in height. The chopping or first hoeing of cotton should not be done until danger of cold weather has passed and there are four to eight leaves on the cotton. On ordinary land where cotton will grow from two to three feet high, ten or twelve inches is wide enough space to allow, and on the richest land two feet is ample space.

THE SPACING OF COTTON TO GET THE BIGGEST YIELD.

For years there has been controversy on the spacing of cotton in order to obtain the greatest yield. In the old days of cotton-growing in Queensland, cotton was often spaced to 6 feet by 3 feet, whether Sea Island or Uplands. To-day experience shows that generally cotton gives the greatest yield when planted in close spacing. The following article on this subject, taken from "Cotton and Cotton Oil News," Dallas, Texas, U.S.A., is well worthy of study by cotton growers in Queensland. The experiments and the results refer to Uplands, not Sea Island cotton, and it should also be noted that the boll-weevil does not occur in Queensland cotton fields.

Recently there has come to us a Mississippi Experiment Station Bulletin which gives in detail the results of cotton experiments at three Mississippi stations in 1916. The results obtained from spacing cotton different distances under boll-weevil conditions are of particular interest.

At the Central Station, latitude 33½ north, on valley land of moderate fertility that had been in cotton several years, the following results were obtained:—

WIDTH OF ROWS.

	Per Acre.
3-ft. rows	620 lb. of seed cotton
3½-ft. rows	540 lb. of seed cotton
4-ft. rows	490 lb. of seed cotton
4½-ft. rows	480 lb. of seed cotton
5-ft. rows	400 lb. of seed cotton

The plants in the above plat, thinned to 12 inches in the drill, grew approximately 4 feet high.

DISTANCES IN THE DRILL.

	Per Acre.
12 in.	576 lb. of seed cotton
24 in.	480 lb. of seed cotton
36 in.	450 lb. of seed cotton

Rainfall during the month of July amounted to 12·63 inches, or nearly two and one-half times the normal, and boll-weevils were very destructive.

At the Holly Springs Station, latitude 35 north, on rather highly fertilised land, the following were the results:—

Variety.	Width Row.	Distance in Drill.	Total Lb. Seed Cotton per Acre.
Triumph	3 ft.	9 in.	1,135
Cleveland Big Boll	3 ft.	9 in.	1,290
Sproull's Big Boll	3 ft.	9 in.	1,161
Triumph	3½ ft.	12 in.	1,304
Cleveland Big Boll	3½ ft.	12 in.	1,632
Sproull's Big Boll	3½ ft.	12 in.	1,323
Triumph	4 ft.	16 in.	1,274
Cleveland Big Boll	4 ft.	16 in.	1,467
Sproull's Big Boll	4 ft.	16 in.	1,158
Sproull's Big Boll	4 ft.	9 in.	1,255
Sproull's Big Boll	3½ ft.	12 in.	1,304
Sproull's Big Boll	3 ft.	16 in.	1,367

In regard to the above, Professor Ames, of the Holly Springs Station, says:—"As may be seen from the table, the best yields were secured from the drill. Spaced in this way there are 3½-foot rows with the plants spaced 12 inches in the approximately 12,000 plants on an acre. The varieties used in this test are all rather leafy and growthy. The land, too, was rather highly fertilised. On poorer land with less growthy plants the results would probably have been different."

At the Mississippi Delta Station, on rich loam land, the following results are reported, all rows being 3 feet and 9 inches wide:—

Variety.	Distance in Drill.	Seed Cotton per Acre.
Express-41	Unthinned	1,330
Express-41.	6 in.	1,470
Express-41	12 in.	1,400
Express-41	18 in.	1,470
Trice	Unthinned	1,715
Trice	6 in.	1,750
Trice	12 in.	1,680
Trice	18 in.	1,610
Lone Star	Unthinned	770
Lone Star	6 in.	805
Lone Star	12 in.	1,120
Lone Star	18 in.	1,050
Columbia	Unthinned	945
Columbia	6 in.	945
Columbia	12 in.	1,015
Columbia	18 in.	1,085

Commenting on these results, Director G. B. Walker says:—"Though the results from this experiment are not conclusive, it appears that with the early dwarf varieties, like Trice, close spacing will give the

highest yields, especially where only the early fruit can be counted on. The later, large-leaved varieties appear to yield better if given more space."

Turning now to Louisiana, where for twelve years farmers have had to fight the boll-weevil for the cotton crop, we find the following interesting results obtained by Newell, of the Louisiana Experiment Station:—

In 1907, on sandy loam upland at Mansfield, Louisiana, with Triumph cotton fertilised with a mixture of 200 lb. acid phosphate and 100 lb. cotton seed meal per acre, with cotton in rows 6 feet apart and plants 18 inches in the drill, the yield was 734 lb. seed cotton per acre; in 4-foot rows and plants 12 inches in the drill, 892 lb. per acre; and in 3-foot rows and plants 10 inches in the drill, 947 lb. per acre.

The next year the same land was planted to the same variety of seed and similarly fertilised, with the following results:—Six-foot rows, plants 20 inches in the drill, made 838 lb. of seed cotton per acre; 4½-foot rows, plants 15 inches in the drill, 993 lb. per acre; and 3-foot rows, plants 12 inches in the drill, 1,344 lb. per acre.

In 1908 a similar test with Triumph cotton was conducted on sandy chocolate land, fertilised with 300 lb. of acid phosphate per acre, at Mansura, Louisiana, with the following results:—Six-foot rows, plants 18 inches in the drill, yielded 474 lb. of seed cotton per acre; 4-foot rows, plants 10 inches in the drill, 621 lb. per acre.

The same year a similar test with Triumph cotton, unfertilised, was conducted on rich alluvial land at Bayou Pierre, Louisiana, with the following results:—Seven-foot rows, plants 24 inches in the drill, yielded 308 lb. of seed cotton per acre; 4½-foot rows, plants 15 inches in the drill, 553 lb. per acre; and 3½-foot rows, plants 12 inches in the drill, 636 lb. per acre.

These experiment station results, when we bear in mind that they are in line with similar results obtained by other stations both in and out of boll-weevil territory, indicate quite clearly that on average lands rather close spacing will give the largest yields. Certainly the old advice, "Space wide and let the hot sunshine kill the weevil," is bad.

[The moral for Queensland cotton growers, who have not the boll-weevil to contend with, is still "To space wide is bad."—ED. "Q.A.J."]

THE COTTON CROP, 1916-1917.

The Agricultural Department, in reply to advertisement, received early in August several tenders for the cotton which was being ginned by the Department, and the Minister accepted the highest tender of 11d. per lb. for the cotton, delivered in Brisbane. The successful tenderers were Messrs. Foy and Gibson, Brisbane. An accurate calculation was not possible until ginning operations were concluded, and considerable quantities of seed cotton were still coming in. It was estimated, however, that the return to the growers would be about 3½d. per lb. of seed cotton, as against a fraction over 2½d. last year. It was at first estimated that

the total of ginned cotton would be about 17,000 lb., but since cotton came in very freely it was estimated to reach about 30,000 lb. Last year the growers received a net return of 2·54d. per lb. of raw cotton, which at the low average of 1,000 to the acre is equal to £10 14s. 3d. per acre. The average cost of planting, cultivating, and harvesting a 1,000 crop is estimated at £2 16s. 11d. The net return to the growers of the 1916 crop was £7 14s. 9d. per acre. The planting season is now upon us, and those who require seed should apply to the Department, and it will be supplied free of cost. About 10 lb. of seed—a generous allowance—are needed for an acre, which under ordinary circumstances should return at least 1,000 of seed cotton. Much larger returns have been made in Queensland, especially during the 1907 season, when the following yields per acre were obtained:—At Wallumbilla, 2,240 lb.; Tallegalla, 4,250 lb. and 3,527 lb.; at Vernor, 3,006 lb., 1,473 lb., and 1,300 lb.; Mackay, 1,368 lb. Similar results were obtained in 1915, but only on a limited scale.

Intending growers who have the Department's pamphlet on cotton-growing should note particularly the remarks on "The New System of Cotton Cultivation" to ensure the production of an earlier crop and increased yield.

THE COTTON OUTLOOK FOR 1917-1918 IN THE UNITED STATES OF AMERICA.

Reports from the cotton belt are anything but encouraging. Low temperatures have been experienced in many sections, which have further accentuated the lateness of the crop. This is most disquieting when the need for a large yield is so essential.

Reports advise the steady migration from the South to the North of negroes, and it is estimated that 309,000 have left the cotton belt during the last eight months.

The successful prosecution of the war is receiving greater attention than trade, but this cannot continue indefinitely. The strong statistical position of cotton, which will be emphasised by the probability of the new crop being inadequate to provide a surplus over requirements, must command attention. Everything points to the cotton supply position during the next eighteen months occasioning the cotton trade of the world anxiety.

The stocks of manufactured goods throughout the world are acknowledged to be low. Consequently at some future date replenishment must take place.

The probability is that demand from countries other than Europe would be large, given reasonable facilities for trading. Therefore, in looking ahead, it would be unwise to place the world's requirements of American cotton under 14,500,000 to 15,000,000 bales.

The importance of augmenting the cotton supply has been repeatedly urged, but never before was the necessity so urgent as at present to avert a shortage.

LINTERS AND GUN COTTON.

The processes through which cotton passes in its preparation for use in the manufacture of guncotton are described in the following statement which was prepared by the United States War Department:—

"The cotton used in explosives manufacture consists of unspun short fibres, generally the linters and hull fibres which remain after the earlier ginning has removed the longer fibres more valuable for spinning and less suited to the manufacture of explosives. As an example of the treatment of this material, the United States Army specifications for smokeless powder require that the cotton be purified and bleached and thoroughly washed to remove the purifying and bleaching materials, salts, &c., and that, as the result, the cotton shall contain not more than 0·4 per cent. of extractive matter, not more than 0·8 per cent. of ash, and not more than 'traces' of lime, chlorides, sulphates, &c., also that it be of uniform character, clean, and free from such lumps as would prevent uniform nitration. It is delivered to the explosives factory in bales, sometimes compressed, sometimes not, but always covered with paper or other material for protection from dirt.

"In making smokeless powder or explosives, the cotton generally after being run through a picking machine to separate the fibres is dipped into nitric and sulphuric acids to nitrate it, producing nitro-cellulose, which is then washed, boiled, cut in a beater or pulping machine, further washed, and then wrung in a centrifugal. Up to this point the only important difference depending upon use is the degree of nitration, being more highly nitrated if for use as a high explosive. Such nitrocellulose, generally called military gun-cotton, is usually after the foregoing operations completed by pressing into blocks. If for smokeless powder the nitrocellulose must, however, be thoroughly dehydrated, mixed with a suitable solvent, and worked to a very stiff paste or colloid, either alone or mixed with other ingredients (nitroglycerine, &c.), and is then forced from a hydraulic press through dies and cut into grains of desired length, and dried."—"Cotton," official journal of the Manchester Cotton Association.

KUDZO.

To an exchange Mr. B. Harrison, F.R.H.S., contributes the following information concerning Kudzo, a plant which, because of its drought-resisting and soil-enriching properties, is claiming attention in various parts of Australia:—

The plant is a native of Japan, where it is a leading crop, and it is also highly commended by the United States authorities. This is a perennial vine, and its numerous merits, compared with lucerne, which is styled the "king of fodder plants," are many. It succeeds in any class of soil, if drained, does not require any fertiliser, it rapidly enriches poor soil, it does not require to be cut at a certain time to save it. It will

transform poor soil or barren hillsides into profitable use. it makes good permanent pasture, and it is not injurious to stock at any stage—either green or dry—and when fed to cows it will produce more and richer milk than any other single feed, as it is more nutritious than either lucerne or bran. It is said that in the United States it has produced four cuttings of 2½ tons each per acre annually. It is very drought-resistant, as it roots deeply, and the vines cover the ground with foliage which acts like mulch and conserves moisture. It is also said that land planted with kudso soon becomes like the rich soil that has recently been cleared from the virgin forest, and it becomes richer each year through the large quantity of nitrogen deposited therein. It should be cultivated in rows 8 ft. apart the first season, after which it will require but little attention.

IS A MECHANICAL COTTON-PICKER POSSIBLE?

Many attempts to invent a mechanical cotton-picker have been made, and several machines have been patented that will pick cotton, but none as yet has proven practical. The best of them either do too much damage to the stalks or they are too costly to operate.

Up to date the Southern negro has proven the best and cheapest cotton-picker.

No mechanical device has yet been found to take his place in gathering cotton. It might be rash to say that no mechanism can be invented that will pick cotton successfully and at a cost that will justify its use in the field.

Man has made other successful inventions that appear to be as intricate and as difficult as it is possible for machinery to be, yet a really practical, successful cotton-picker seems to defy the inventive genius of man.

Why should a cotton-picking machine be more difficult to make than the cotton gin, the sewing machine, the great self-binding reapers that harvest our grain for us, or the mighty printing presses that print and fold thousands of newspapers an hour? What is peculiar about the picking of cotton that renders a machine for the purpose any more difficult to construct than the inventions mentioned?

The answer to these questions may furnish the crux of the difficulty and yet leave the problem as far from solution as ever. In all the many useful machines that serve the purposes for which they were devised the material on which they operate is fed to them mechanically, but the machine that picks cotton must hunt the material on which it is to operate in a wilderness of foliage, branches, and bolls. Can a machine be made to do this successfully? *Quien sabe?*—"Cotton and Cotton Oil News."

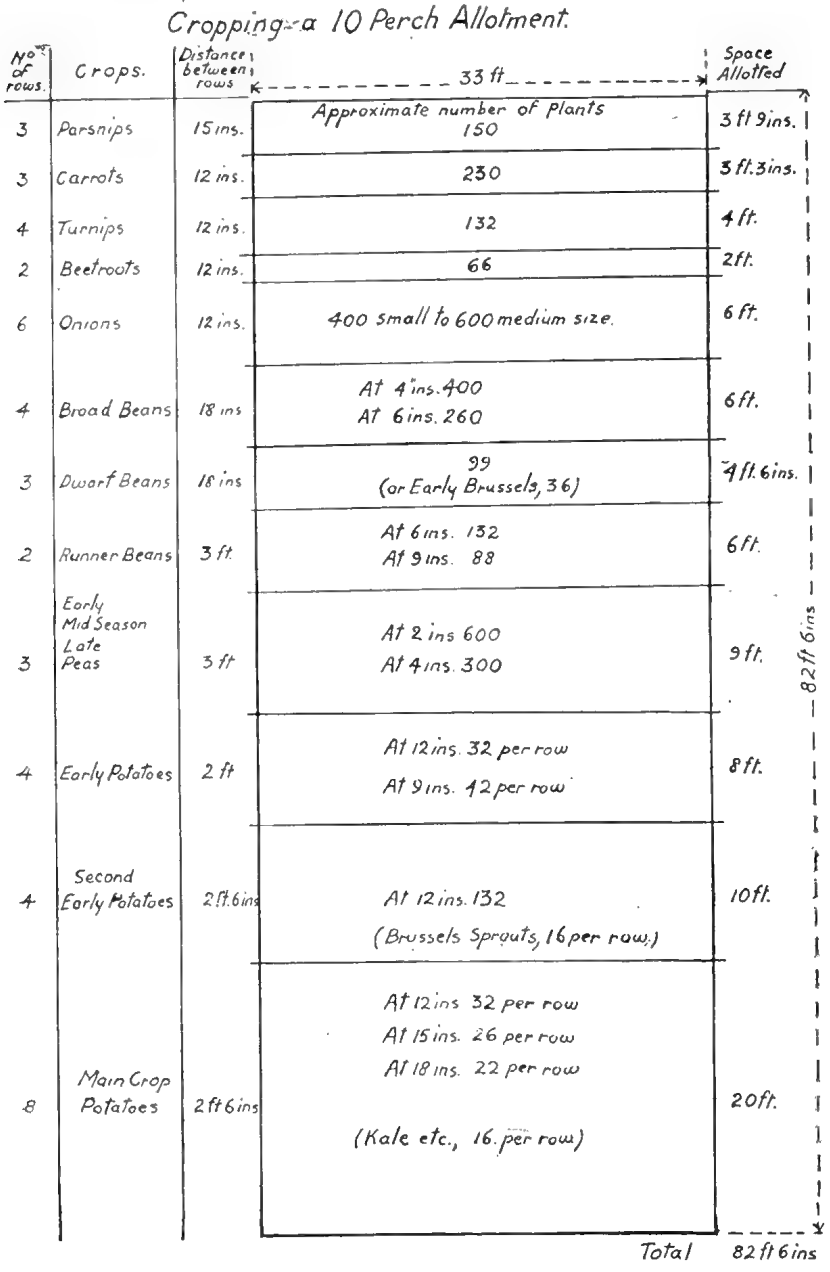
MARKET GARDENING.

CROPPING A 10-PERCH ALLOTMENT.

Many people who have not previously had a garden are now endeavouring to grow vegetables on a small allotment, and some are, naturally enough, puzzled as to what quantities of the different kinds of vegetables it is possible to grow. The following article and plan of a garden which we take from the "Journal of the Board of Agriculture," London, are as applicable to Queensland as to England. They are based mainly on the assumption that most people will desire to grow several of the simple crops, in addition to potatoes. In the accompanying plan, the ground allotted to potatoes amounts to a little less than half the 10 perches, or just over 4½ perches. This area can easily be increased at the expense of the other crops, and, in particular in place of peas, for which the ground allotted adjoins the potato patch. Where manure is not too plentiful, legumes, *i.e.*, peas and beans, are of great value, since they collect nitrogen for other crops; hence the apparently large area devoted to these crops. After they are removed the ground may be dug and prepared for the small seeds of the following season, and for the second year the potatoes may be removed to the other end of the allotment, while the legumes should be removed to the patch now set out for potatoes. Many variations of the plan are possible. No ground has been set out for such crops as spinach, leeks, celery, &c., nor for salad crops, except as regards the vacant ground between peas and beans. The crops indicated are the staple crops of the garden, but others may be planted as the season for some of them is over, or space may be found on the border of some of the beds for salad crops and herbs, eschallots, as well as for a few bush marrow plants.

As regards manure, dung is the best all-round manure, and may be applied at the rate of 1 cwt. per perch. As a substitute there are many kinds of artificial manures which are normally used. Nitrates produce fine, luxuriant foliage, *e.g.*, they are useful for the cabbage and similar crops; phosphates induce earlier production of fruit and flowers, and will be found most useful with beans, peas, turnips, parsnips, &c.; while potash increases the substance and improves the quality of fruits, tubers, and roots, and it is excellent for potatoes. Guano is the best artificial fertiliser for the garden, as it contains all three of the plant foods mentioned. Pigeon and poultry dung are good substitutes. These may be applied at the rate of 4½ lb. to 7 lb. per perch. They should be mixed and pulverised with some fine, dry material, such as earth ashes or fine coal ashes. Wood ashes contain considerable potash, and for potatoes should be applied at the rate of about 4 lb. per perch. Heavy soils are benefited by lime. This may be applied at the rate of 2 to 5 bushels per 10 perches. It is best applied before the crop is planted, and thereafter it may be sprinkled on the top of the ground in small quantities. Fresh gas-lime is injurious to vegetable life.

As two crops of potatoes are anually raised in Queensland—the summer and the winter crops—a different rotation would be needed.—(Ed. "Q.A.J.")



LAYING OUT THE GARDEN.

ECONOMY IN THE USE OF SEEDS.

It is important in the national interest that everyone who is sowing vegetable seeds should exercise economy in order that no more seed should be sown than is necessary. In ordinary times, when seed is both plentiful and cheap, it is often used with a free hand, but at the present time the seeds of many vegetables are neither plentiful nor cheap, and it is therefore not only a wise economy but also a duty to make seed go as far as possible.

The following hints will be of use in this connection:—

1. The seeds of many vegetables, especially if they are from a good harvest, retain their germinating power almost unimpaired for several years. This is true, for example, in the case of seeds of leguminous food plants—peas, beans, scarlet runners, French beans, &c. Therefore, before opening this year's seed packets, seeds of these kinds of vegetables left over from last year's seed order should be tested in order to ascertain whether they will germinate well or not. This is very easily done. All that is necessary is to line two saucers with pieces of flannel or with blotting-paper and to moisten, but not thoroughly to wet, the flannel or blotting-paper. A known number of seeds (20 or 30) should be placed, well separated from one another, in one of the saucers. The other saucer is then inverted on the one containing the seeds, and the saucers are stood in a moderately warm place, and to prevent drying up by evaporation may be covered with a bowl, jar, or newspapers. The germination will be quicker if before the seeds are placed in the saucer they are soaked in water until they have "plumped up"—for example, they may be soaked over night. After a day or two, the saucers being examined daily, the seeds which have begun to sprout are counted and removed. The rate of each seed's germinating varies very much according to the kind, so that the test must run on for a time, varying from two or three days to ten days or a fortnight. If a fair proportion of last year's seeds germinate they should be sown, and this year's seeds may be kept in their unopened packets for use next year.

2. Seeds should be sown as thinly as possible, but at the same time it must be remembered that if sown too thinly there may be gaps when the seedlings come up.

3. It should be remembered that many seedlings transplant quite well, so that carefully lifted thinnings can be used to increase the number of rows.

4. Care should be taken to ensure that there is no wasteful use of such seeds as those of cauliflower. At the same time, large gardeners should remember that a few dozen seedlings (good varieties) of cabbages and savoys are often a welcome gift to the smaller gardeners in their neighbourhood.

5. Anyone who has parsnips, beet, carrots, leeks, celeriac, or cabbages sown last year should leave some of each of these plants in the ground, let them run to seed, and if they do seed should be saved. Home-saved seed should, if possible, be protected from birds, and should be allowed to ripen thoroughly, should be harvested when ripe, and all the bad seed picked out and burnt, and the rest kept away from the air in a cool, dry place. The risk of disappointment in some cases owing to a wet autumn is well worth taking.

6. Another point which amateurs would do well to remember is that mice are very fond of certain kinds of seeds—certain peas, for instance. The seed should be slightly moistened and mixed with a little red lead so that the seed is avoided by vermin. Birds also are very apt to peck and destroy seedlings. Where netting is not available, three or four strands of black cotton stretched over the rows on sticks will often serve to keep birds away.—"Journal of the Board of Agriculture."

NEGLECTED INDUSTRIES.

THE PRODUCTION AND INDUSTRIAL EMPLOYMENT OF VEGETABLE OILS.

When we consider the large quantities of various vegetable oils annually imported into Queensland for use in a variety of industries, and that all the plants producing such oils find a congenial home in all parts of the State, according to the necessary climatic conditions, it is remarkable that no enterprising capitalists or companies have as yet not turned their attention to utilising these resources by manufacturing a product which is of first-class or of considerable industrial importance. The principal vegetable oils and their sources are discussed in the following article which appeared in "The Engineer" (16th February, 1917) :—

LINSEED.

Linseed is undoubtedly one of the most important, if not the most important oil known to man, and is derived from the seeds of the flax plant. This plant is cultivated in two distinct forms, one more richly flowered than the other, and therefore grown for the sake of the seeds. This variety is chiefly cultivated in Russia, India, Canada, the United States, and the Argentine. The Russian, particularly from the Baltic district, is perhaps the most highly esteemed source of linseed oil. The seed contains from 38 to 40 per cent. of oil. The oil is recovered from the seed very commonly by hot pressing. The hot press cake retains about 10 per cent. of the oil, and forms an extremely valuable and wholesome cattle food. Occasionally the seeds are pressed cold for the recovery of an edible oil. The hot pressed oil is of wide application in the arts, and is used extensively in the manufacture of soft soaps. Its high specific gravity and its fine drying qualities make it of first importance in the manufacture of paints and varnishes. The chemical changes which occur when linseed oil "dries" are not clear, but it is certain that the main feature is the oxidation of the oil. The oxygen is taken up rapidly, and transforms the oil into a flexible solid mass, known as "linoxyn," which is manufactured on a large scale, for it is the principal raw material of the linoleum and oil-cloth industry. In the natural state linseed oil dries to an elastic skin in about three days. If, however, it is prepared by heating it with various salts of lead or manganese, it will dry within six or eight hours. So treated, it is known as boiled oil, and is much used by painters and artists.

COTTON SEED OIL.

This oil has a claim to be ranked next in importance to linseed oil. It is obtained from the seeds of the cotton plant. The Egyptian and Sea Island cotton plants yield a black seed, while the American and Indian seeds leave the cotton gin with a considerable amount of the fibre still adhering to them. This is removed by a special machine. The husks also are removed before crushing the kernels. On an average, the amount of oil which the latter contains ranges from 18 to 24 per cent. according to the plant producing them. The residue left after milling the seed for

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the oil retains all the fertilising properties, and is largely used as manure for sugar-cane, cotton, corn, tobacco, and so on, but it is found that the most economical manner of using it is to feed it to cattle, and to use the resulting manure, which contains 80 to 90 per cent. of fertilising value, on the land.

Cotton seed oil is a so-called semi-drying oil which absorbs oxygen slowly, but by blowing air through it at about 100 degrees cent., the absorption can be increased. Blown cotton seed and other semi-drying oils, similarly treated, become thickened and appear like castor oil. They are produced on a large scale, and when dissolved in light mineral oils are used as lubricants for machinery.

Refined cotton seed oil is in extensive use for edible purposes. It appears on the table as salad oil, it is used by the sardine tinning industry, and under the name of butter oil it forms one of the chief raw materials of the margarine manufacturer and of the manufacturer of lard substitute, or compound lard as it is called. Apart from the very great use of cotton seed oil for edible purposes, its chief industrial employment is in the soap-making industry. It is frequently used in this connection by itself. As an ingredient of toilet soap it is commonly mixed with tallow or coconut oil. It is also widely used in the manufacture of soap powder.

OLIVE OIL.

Olive oil is in several respects chemically and industrially closely similar to cotton seed oil. The latter being cheaper is frequently substituted for it, notably for edible purposes. The reputation of olive oil as an edible oil is, however, too great for it ever to be supplanted completely by any other. The olive tree is chiefly cultivated in the countries bordering the Mediterranean. The fruit of the olive consists of rind, flesh, stone, and seed kernel. All parts contain oil. The fleshy part, forming 80 per cent. of the whole, contains from 40 to 60 per cent. of oil, and yields the best oil for edible purposes. To produce this oil the fruit is gathered before it is quite ripe, and is peeled and stoned. The flesh is then pressed by itself. The kernels are crushed separately, and yield an inferior "olive kernel oil." The pulp left after the pressing of the flesh may contain as much as 20 per cent. of oil. It is ground up with hot water and allowed to stand until the broken-up cellular tissue rises to the surface. This is again pressed for a second-quality oil. The residue is finally extracted with solvents, commonly carbon disulphide. Such extracted oil acquires a deep green colour from the chlorophyll in the fruit, and is principally used for soap-making. In some mills the original fruit is not stoned before being pressed for the first time, but is crushed as a whole. The oil yielded is of a less perfect quality than that obtained by the other process, for it contains the poorer oil derived from the kernels.

The oil derived from the first pressing of the fruit is almost invariably used for edible purposes. A second or third pressing is commonly adopted. The oil so obtained is used for soap-making and for lubricating and burning purposes, for olive oil is a non-drying oil. The press cake is sometimes used locally as a cattle food. The value of the oil,

however, makes it pay to carry the recovery to the greatest possible extent. Hence the last drop of oil is usually recovered by the chemical solvent process.

Castor Oil.

The castor oil tree or shrub—it is found in both forms—grows in all tropical and subtropical countries. The seeds are enclosed in a rough outer shell, and consist of a husk containing a soft, white kernel, constituting 80 per cent. of the seed, and yields from 46 to 53 per cent. of its weight in oil. The husks are oilless. The oil is of the non-drying class, and is of great value as a lubricant. It is extensively used in the soap industry. Its medicinal use depends on the fact that it contains an alkaloid. This alkaloid in excess is poisonous, hence the residue left after crushing the seeds is unfit for cattle food. Hence the oil residue in it is extracted by solvents, such oil being suitable for soap-making and other technical purposes. The ultimate residue is used as manure.

Castor seeds are commonly pressed cold to obtain medicinal oil, and then pressed a second or third time in a hot condition to obtain technical quality oils.

African Oil Palm Oil.

The fruit of the African Oil Palm consists of a fleshy outer layer or pericarp surrounding a hard woody shell within which is the seed kernel. Roughly, the shell forms 50 per cent. of the whole, the fleshy pericarp 35 per cent., and the kernel 15 per cent. Of the pericarp, 50 per cent. or so is oil, while the kernel yields about 45 per cent. In the case of the olive, the oils recovered from the fleshy part and from the kernels are practically the same. In the case of the palm-tree fruit, they are quite different. Palm oil, the product obtained from the pericarp, is used principally in the making of soap and candles. The pericarp, owing to its nature, has to be worked up as soon as the fruit is pulled. Consequently, the factory is placed near the plantation. The kernels, separated from the pericarp, are shipped to the United Kingdom, and (before the war) to Hamburg, &c., and are treated by crushing and extraction with solvents for the recovery of the oil. This oil, in a fresh condition, is largely used in the manufacture of margarine, and, to a considerable extent, when suitably treated, in the manufacture of chocolate. The poorer qualities and the extracted oil are suitable for soap, candle, and paint-making. Palm kernel oil-cake is somewhat deficient in nitrogen, so that its value as a cattle food is less than that of some other qualities of cake. This deficiency also renders the residue from the extraction process of low value as a manure.

Coconut Oil.

Coconuts are obtained from a tree of the palm family, not, of course, from the cocoa (or cacao) tree. The fleshy layer inside the nut, dried, either in the sun or by artificial heat, is known as "copra." The undried flesh contains about half its weight of water, so that, by drying it—an operation carried on at the place where the nuts are gathered—a considerable saving of freight is effected. The copra shipped to the oil

mills is shredded and crushed hot. It yields round about 64 per cent. of its weight in oil, but this figure is subject to variation accordingly to the precise method adopted for drying the copra by the gatherers. Coconut oil is very closely similar to palm kernel oil, and is used for much the same purposes, that is to say, chiefly in the making of margarine and soap. These three oils, palm, palm-kernel, and coconut oils, are all of the non-drying type, and are to be regarded as vegetable fats rather than as oils.

It may be noted here, that although coconuts do not grow on cocoa trees, still, coconut oil—and also palm kernel oil—is of great value to the chocolate manufacturer. The cocoa bean, when roasted and ground, contains about 50 per cent. of fat, or "cocoa butter," as it is called. This fat renders the cocoa powder difficult of mixture with boiling water and indigestible. It is, besides, a valuable substance in itself, being used in medicine and soap-making. Hence it is frequently removed to the extent of about half its original amount by submitting the ground cocoa powder to hydraulic pressure. In working up the cocoa powder into chocolate of the best quality, a portion of the extracted cocoa butter is returned to it. In other chocolates the valuable cocoa butter is omitted, and coconut oil, suitably treated, or palm kernel oil, is used instead.

Soya Bean Oil.

The Soya Bean plant flourishes in Manchuria, China, and Japan. In Manchuria, the cultivation of the plant is stated to have been the main agricultural industry for centuries, while the production of soya bean oil and oil-cake formed the most important manufactures of the country. The bean cakes have for long formed one of the chief articles of food for the inhabitants. Nevertheless, the bean and the oil it yields were almost unknown in Europe until the Russo-Japanese war. Since then the production and use of soya bean oil and soya bean cake have developed phenomenally. The oil in Europe now rivals that obtained from the cotton seed, while the cake, on the Continent at least, is contesting the position as a food for milch cows held by linseed and cotton seed cake. The oil belongs to the semi-drying class, and is used for edible purposes, as an illuminant, in soap-making, and in the manufacture of linoleum. The bean contains about 18 per cent. of oil, and in the press yields from 10 to 13 per cent.

Rape or Colza Oil.

The rape plant is grown extensively in many European countries, notably in Russia. It is cultivated in British India to an extent which renders the annual crop second only in importance to the linseed crop. The bulk of the Indian seed is shipped to England, but Germany used

to have a preponderating hold on other sources of supply. Rape oil belongs to the semi-drying class, and is principally used for burning purposes and as a lubricant. In the latter case the oil is frequently "blown," as mentioned above under cotton seed oil. To a small extent rape oil when obtained by "cold drawing" is used for edible purposes, notably by bakers in the production of bread. It is commonly employed as a quenching medium for steel plates, &c., and on the Continent is used occasionally in the manufacture of soft soap. The seed contains anything from 33 to 43 per cent. of oil. It is frequently extracted by means of solvents. The oil apparently contains a poisonous element. Consequently rape seed cake is not greatly valued as a cattle food. It may, in fact, be said that the bulk of the residue left after either crushing or extraction with solvents is used as a manure.

MUSTARD OIL.

This oil is obtained from the black, white, or wild mustard plant, and is used in soap-making and as a substitute for or adulterant in rape oil, with which it is closely similar. The cake left after crushing is, however, a more important product than the oil. When ground, this cake gives the mustard of the domestic table.

SUNFLOWER OIL.

The sunflower is cultivated for the sake of its seeds on an immense scale in Russia, Italy, India, and China. The seeds, raw or roasted, are used in Russia as an article of diet. The oil recovered from them by crushing is, when refined, considered by some to equal olive oil for edible purposes. Its chief use, however, is in soap and candle-making. The seeds contain from 20 to 23 per cent. of oil. For cattle-feeding purposes the cake is not only very palatable, but being rich in nitrogenous matter is of great food value. Sunflower oil belongs to the drying class. The sunflower is very readily cultivated, and produces a high yield of seeds. It is believed that the Central Empires, cut off as they are at present from many important sources of oils and fats, are cultivating the sunflower on an extensive scale in an attempt to reduce the deficiency. They are probably growing flax—for linseed oil—also on a considerable scale; but flax, it is to be noted, rapidly exhausts the soil and is, therefore, in all likelihood being cultivated to an extent only slightly greater than in peace time. It may perhaps be added that the rumours recently in circulation as to Germany's shortage of glycerine and the horrible means she is adopting to make it good cannot be accepted as true by those qualified to judge. In the first place Germany uses

little or no glycerine in the production of her explosives, differing in this respect from this country which, of course, depends extensively upon nitro-glycerine. In the second place the yield of glycerine from the source suggested would be altogether too insignificant to justify the cost, trouble, and difficulty of recovering it.

POPPY SEED OIL.

The seed of the poppy contains from 45 to 50 per cent. of an oil which, when "cold drawn," is almost colourless, has little odour, and possesses a pleasant taste. It is in extensive use on the table as a salad oil, and is highly valued by artists and artists' colourmen. The seeds are usually expressed twice, the second pressing being carried out hot and yielding an inferior oil, which is extensively employed in making paints and soft soaps. The oil belongs to the drying class. Poppy seed cake is rich in nitrogen and is highly valued as a cattle food.

As showing the enormous value of the output of oil-seeds and vegetable oils in India, a report on the progress of agriculture in that country for 1915-1916 shows that the Indian export trade in oil-seeds and vegetable oils is worth, annually, over £16,500,000 sterling. Only about one-third of the output is exported, and the remainder is used in the country. After the outbreak of the war the exports of oil-seeds have naturally declined. The oil-seeds that have been mostly attended to are ground nuts (peanut), sesame, and coconut. The area under ground nuts has increased from 431,000 acres in 1901-1904 to 2,413,000 acres in 1914-1915. From a small beginning in Burma in 1902 the crop now occupies 262,000 acres. The net profit per acre from its cultivation has been estimated at 47 rupees (about £4 6s.).

With regard to sesame, the Indian (Burma) crop covers something like 1,000,000 acres anually.

The importance of the coconut palm tree in South India may be gauged from the fact that the value of exports of its various products during 1914-1915 amounted to over £1,500,000 sterling.

A NEW INDUSTRY IN PAPUA—MANGROVE BARK.

It looks (says "The Papuan Courier") as if there is every possibility of this becoming a great industry, and the pioneer of the trade, Mr. Butterworth, is now shipping large quantities of the bark to Australia, and various other small companies and syndicates have been formed.

The mangrove tree might be termed a land builder, as it collects and binds the soil in swamps and shallows, and in course of time large areas are in this way reclaimed.

The settlers employed in this industry should receive every assistance from the Government as regards concessions and reduced rates from the coastal and ocean shipping companies.

An industry which has for its object the extraction of chemicals from mangrove bark for the purposes of tanning is about to be started in Papua.

Mr. Ross, the representative of a Melbourne company, after three or four visits to Papua, has finally decided to recommend his company to commence operations.

Accompanied by Mr. G. Lincolne (of the firm of Messrs. Lincolne, MacDougall, and Demaine, civil and consulting engineers, of Melbourne), various sites have been inspected, and Kerema has been settled on as the place most suitable for the company's requirements. Other localities are in view to extend their operations once a start has been made. Permission has been granted by the Federal Treasurer to allow of the company to operate, and a sum of at least £20,000 is to be expended in the purchase and erection of a plant. Of course, some little time must elapse to enable the necessary machinery to be built and erected.

Both Mr. Ross and Mr. Lincolne stated, in an interview with our representative, that they were confident of the ultimate success of the enterprise, and that a great future exists for their operations. A chemist had been experimenting with the mangrove bark with the object of eliminating all dangerous chemicals therefrom.

We have no doubt all possible assistance will be granted by the Government towards facilitating matters for the new company.

Incidentally, Mr. Ross made inquiries in the direction of erecting a pulp mill for the manufacture of paper, but negotiations in that direction are at present in abeyance. In view of the present high cost of paper in Australia, and consequently in Papua, a movement in the direction of making paper here, with its huge timber resources, and the large amount of waste products inseparable from timber-getting, must recommend itself to all and sundry. A great deal of the business of the community is at any time likely to be hung up, owing to the insufficiency of paper supplies, and until the termination of the great European conflict no improvement in conditions can be looked for.

EXHIBITION NOTES, 1917.

THE EXHIBITS OF THE DEPARTMENT OF AGRICULTURE AND STOCK AT THE EXHIBITION OF THE QUEENSLAND NATIONAL ASSOCIATION, AUGUST, 1917.

Since the inception of the Queensland National Agricultural Association, forty odd years ago, there has been constant progress, despite initial difficulties, droughts, and eventually the destruction by fire of the first Exhibition Building at Bowen Park in June, 1888. It might have been and probably was anticipated that, owing to the increased exigencies of the war, necessitating special taxation, to the frequent disturbance of both rural and urban industries, consequent upon the many industrial strikes, and latterly to a long spell of dry weather, the prospects of a successful Exhibition in August, 1917, would not be very bright. Yet the very reverse has happened. That Exhibition was such a wonderful success, excelling all previous efforts in its results, that a casual visitor, unacquainted with the recuperative powers of the agricultural and pastoral industries of the State, might be excused for his belief that Queensland had been revelling in splendid seasons, and, consequently, in unreduced productions of nature and art, and it was, at the outset, generally conceded that the Exhibition of 1917 would prove a shining light in the history of the forty-two Exhibitions of the National Association. Nor were these anticipations destined to be erroneous. On the first day, before the official opening, the attendance numbered 6,000, the receipts being £72 7s. Only twice was this exceeded, and singularly enough, once, in point of numbers, during the great strike of 1912, when the record was 7,000 on the first day, representing receipts amounting to £87 13s., and the second time in 1914, in cash receipts from 4,800 visitors amounting to £88 2s. 6d.

The value of the work of the Association consists not merely in the amount of money taken at the gates and otherwise, but in its effects in bringing together people from all parts of the Commonwealth, as well as many from oversea, thus advertising far and wide the great resources, animal, mineral, vegetable, and industrial, of this, the most resourceful of all the States of Australia. The general public is naturally unaware of the great volume of business transacted during and after the Show, as a direct consequence of the advantages offered to business men, and to buyers and sellers generally, by personal inspection of the exhibits and personal communication with sellers and agents.

The limits of this Journal will not admit of our giving an exhaustive description of the multifarious exhibits and awards in this connection. That we must perforce leave almost entirely to the enterprise of the metropolitan and rural journals, confining ourselves to special salient points.

A word may here be appropriately added as to the onerous duties of secretary of the Association, which has from its inception been fortunate in the choice of its "first lieutenants." On the decease of the

late Mr. Arvier, to whom the success attending many previous shows was due, the present secretary, Mr. J. Bain, has given ample evidence of his good organising ability, and he has carried on the good work since 1915 with an energy and enthusiasm which must be instrumental in building further success upon the solid foundation which he and his predecessors have laid. The position of secretary to an important Association such as this one, demands much tact and firmness, especially at Show time.

EXHIBITS OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

Amongst the best arranged agricultural courts at the Exhibition this year, the display made by the Department of Agriculture and Stock undoubtedly takes a foremost place, and much is there to convince the stranger that Queensland is a most desirable State to select for a home. In this section, as also in those of the district sections, may be seen practical proofs of the extraordinary resources of the country, as well in climate, rainfall, and soil as in the vast areas of agricultural and pastoral land open to selectors. As far as rainfall is concerned, it must be confessed that occasionally severe droughts occur, and, as a matter of fact, for the four months preceding the Exhibition of 1917, very little rain fell in the Southern and Western districts, but to judge by the splendid exhibits of agricultural produce of all kinds, of cattle, horses, sheep, &c., this dry period had no generally bad effect on production.

Taken as a whole, the exhibits were so arranged as to bring before the public a number of individual sections, representing a part of the Department's activities, these being classed in such a way as to afford as much information as possible, and, at the same time, being of a highly educational character. The Court, this year, was arranged in a different manner to that of 1916, and afforded far more space for visitors to move about freely and inspect the exhibits at leisure.

In a general way, the various sections were grouped under four main heads: Temperate, Tropical, Agricultural, and Pastoral.

The several divisions were made up by—

Tropical and sub-tropical products: Exhibits of sugar-cane, tobacco, cotton, &c.

Wool.

Entomology and Plant Pathology, comprising—Diseases of fruits and vegetables; Queensland butterflies, moths, and beetles; insects injurious to fruits and fruit trees; insectivorous insects of the various districts of the State.

Botanical exhibit, embracing the chief natural grasses of Queensland, a large collection of the weeds of Queensland, prickly-pear of various kinds, &c.

Wheat and wheat-milling exhibits, the former being drawn from several of the chief wheatgrowing districts, and from the wheatbreeding State Farm at Bungeworgorai, near Roma.

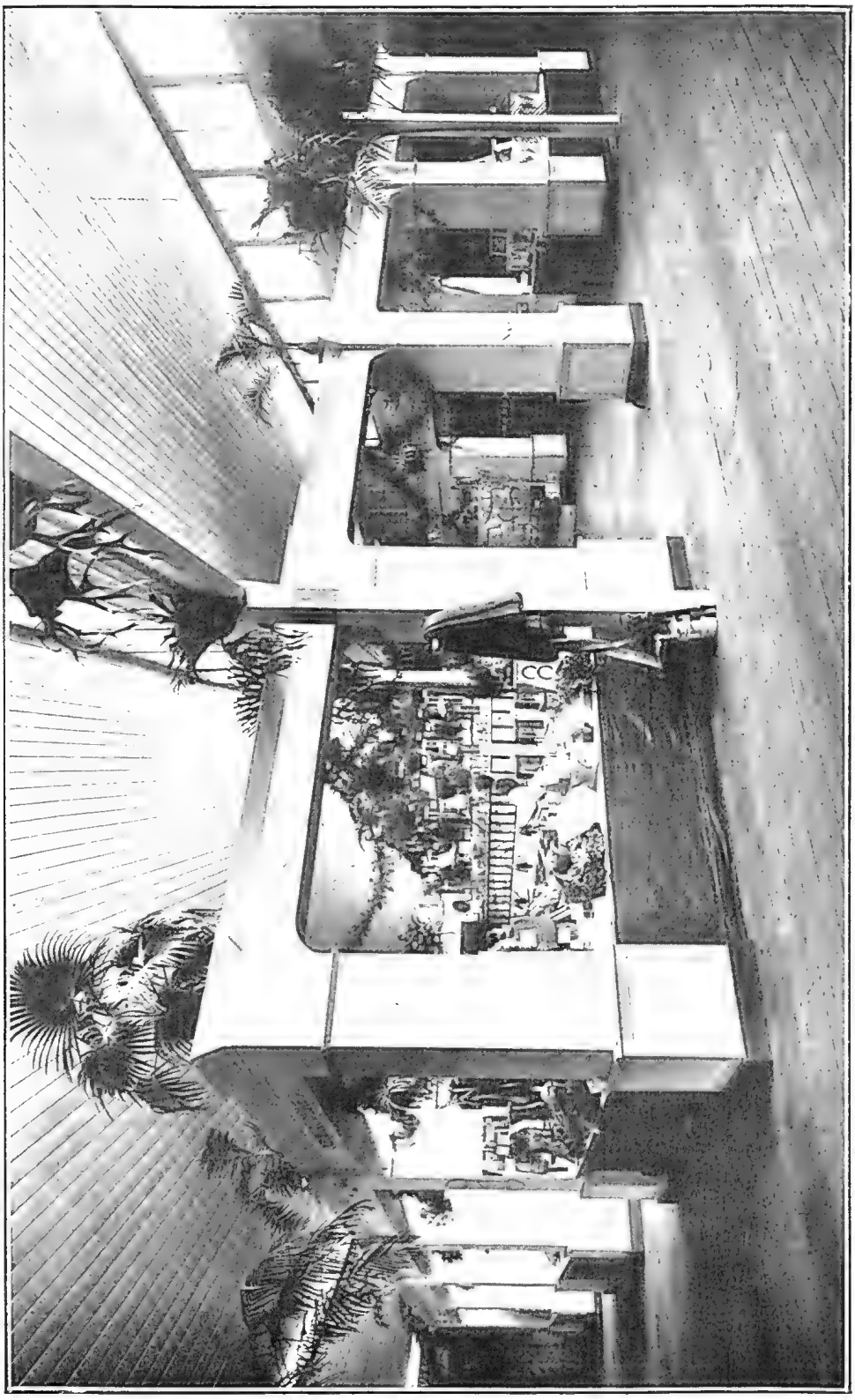

PLATE 9.—GENERAL VIEW OF THE COURT OF THE AGRICULTURAL DEPARTMENT FROM MAIN ENTRANCE.

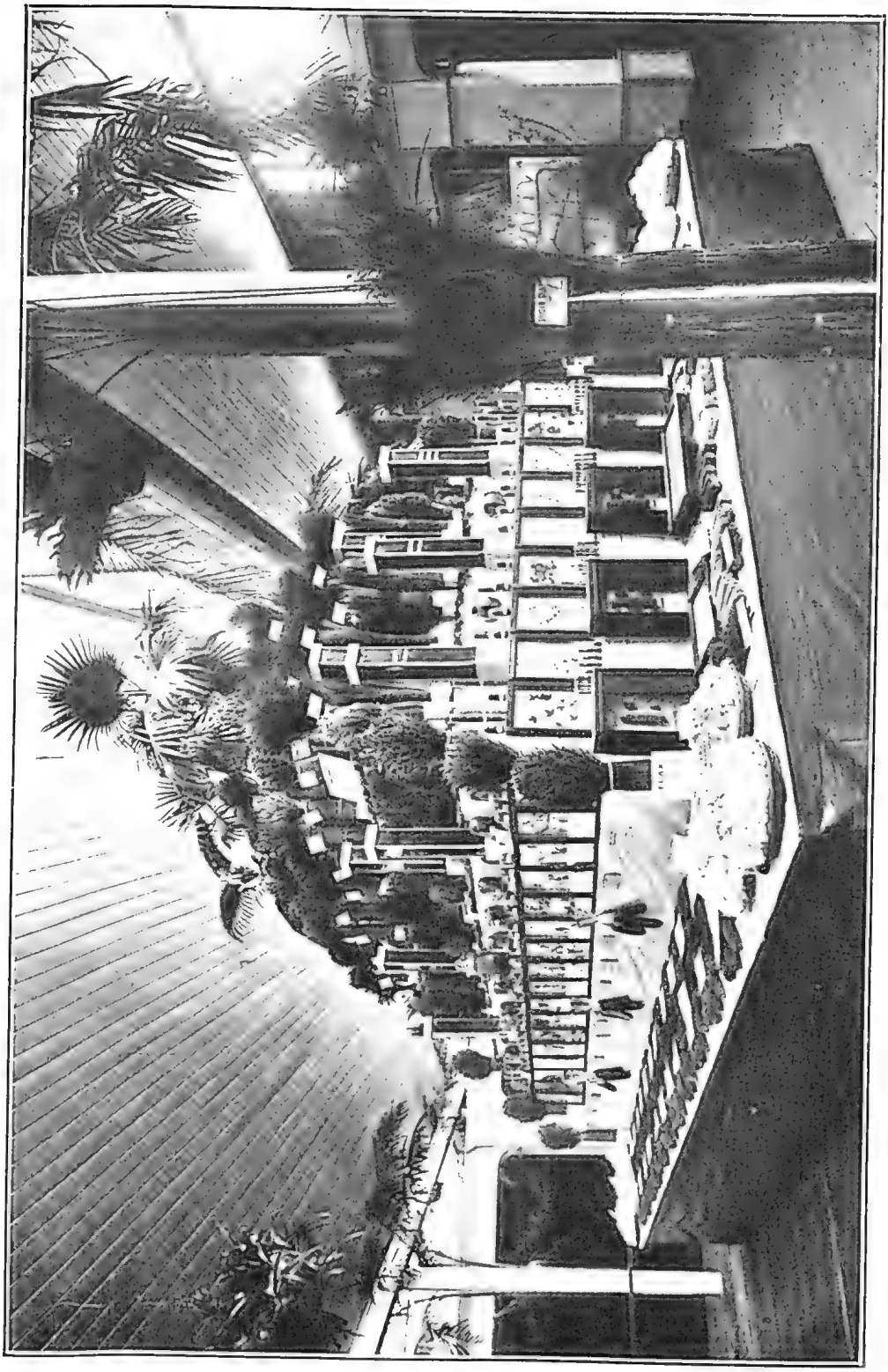

PLATE 10.—VIEW OF THE CENTRAL TROPHY, DEPARTMENT OF AGRICULTURE AND STOCK.

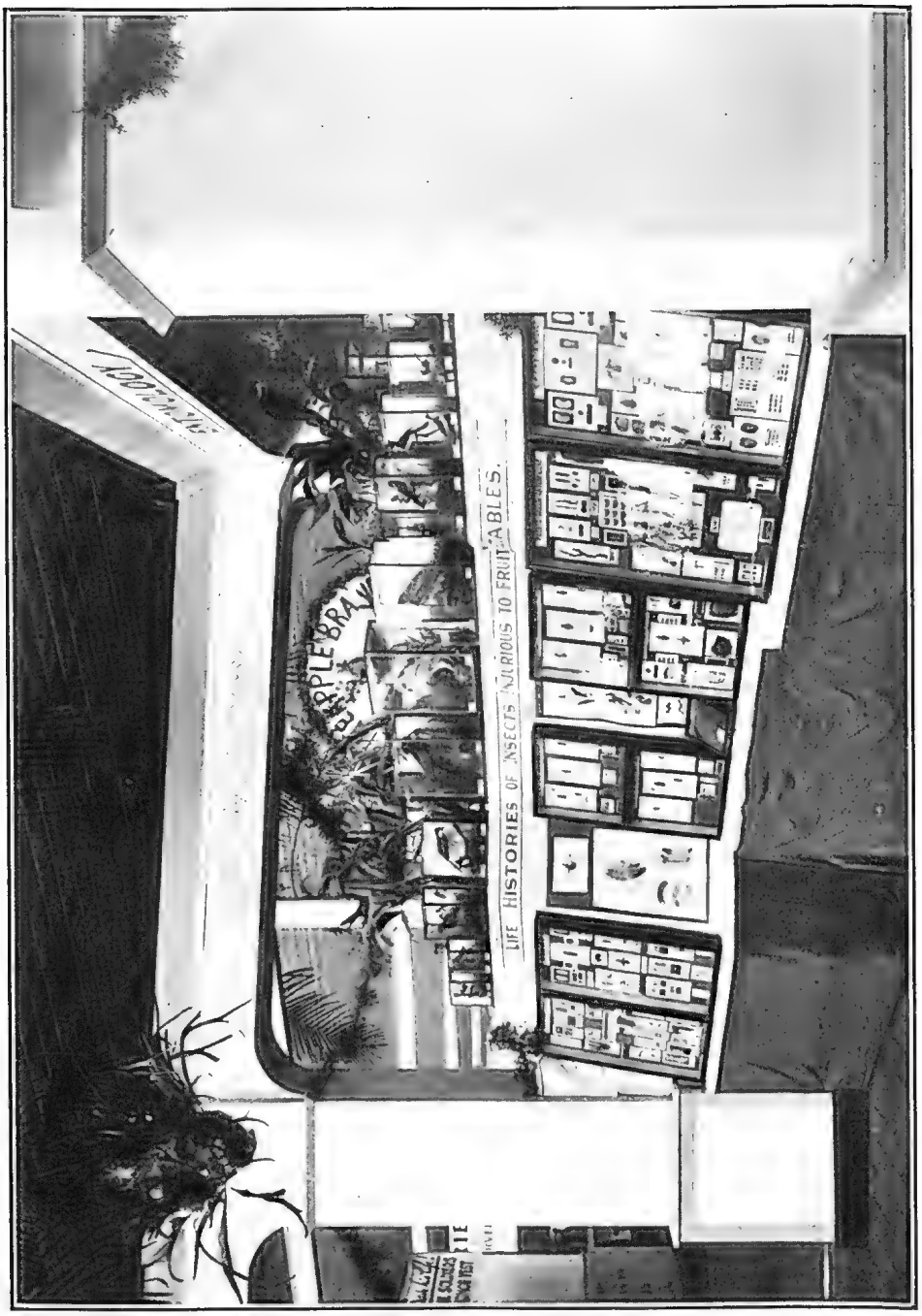

PLATE II.—ENTOMOLOGICAL AND ORNITHOLOGICAL EXHIBITS, DEPARTMENT OF AGRICULTURE AND STOCK.

Maize exhibits, including sample cobs of maize grown by juvenile competitors in the 1916-17 maizegrowing competition, of which the results are given further on.

Bacteriological exhibit from the Stock Experiment Station at Yeerongpilly.

Division of dairying, fruit exhibits, broom and other millets, besides many other farm products, potatoes, hay, silage, vegetables, &c.

The Agricultural College at Gatton came well to the front with farm and dairy products, and such industrial work as saddlery, blacksmithing, and dairying was represented by excellent exhibits of cheese and butter, whilst many of the usual farm and garden products afforded evidence of the excellent work of the instructors.

WOOL.

The wool exhibits comprised—Merino ewes' wool, Dorset Horn, Rams (black), Romney Marsh, Romney Marsh × Merino, Rams', pure-bred British breeds, half-bred. Wool grown on coastal areas, Border Leicester × Merino, Dorset × Merino, Lincoln × Merino, Lincoln. Wool grown at Elimbah, in the coastal area, Romney Marsh × Merino and Merino ewes, and Corriedales. This exhibit was a very fine one, and was collected and got up for the show by Mr. W. G. Brown, sheep and wool instructor, Department of Agriculture, who has devoted himself to the establishment of sheep-raising on the coastal lands with gratifying results.

A model is shown of a sheep spray, such as is successfully employed at Alice Downs Station, Blackall.

SISAL FIBRE.

It may not be out of place to trace the history of sisal-planting back to its original source. Sisal "hemp," as the fibre is usually called, has to-day risen from about £24 per ton to £100 per ton for Java "A" quality, and from £90 to £95 per ton, ex store, according to quality. A few years ago, there was a considerable area planted with sisal in Queensland. The original plants were imported in 1890, and about a quarter-acre was planted at St. Helena Penal Establishment, where they throve remarkably well. Many thousands of young suckers were produced and were distributed gratis to intending growers in many coastal districts of the State. In time, scutching machinery was employed on the island, and splendid fibre was produced. A quantity was sent to the Panama Exposition in 1915, and it is gratifying to know that, in competition with many of the older sisal-growing countries of the world, the gold medal and the accompanying diploma were awarded to the Department of Agriculture and Stock for the best exhibit of sisal fibre at that great Show. These may be seen at the office of the Comptroller-General of Prisons. There are about 5 acres of the plants now in cultivation on the island. There are no longer any large sisal plantations in Queensland, mainly owing to, first, industrial troubles, and next, to the impossibility of shipping the fibre to Europe. What little fibre has been

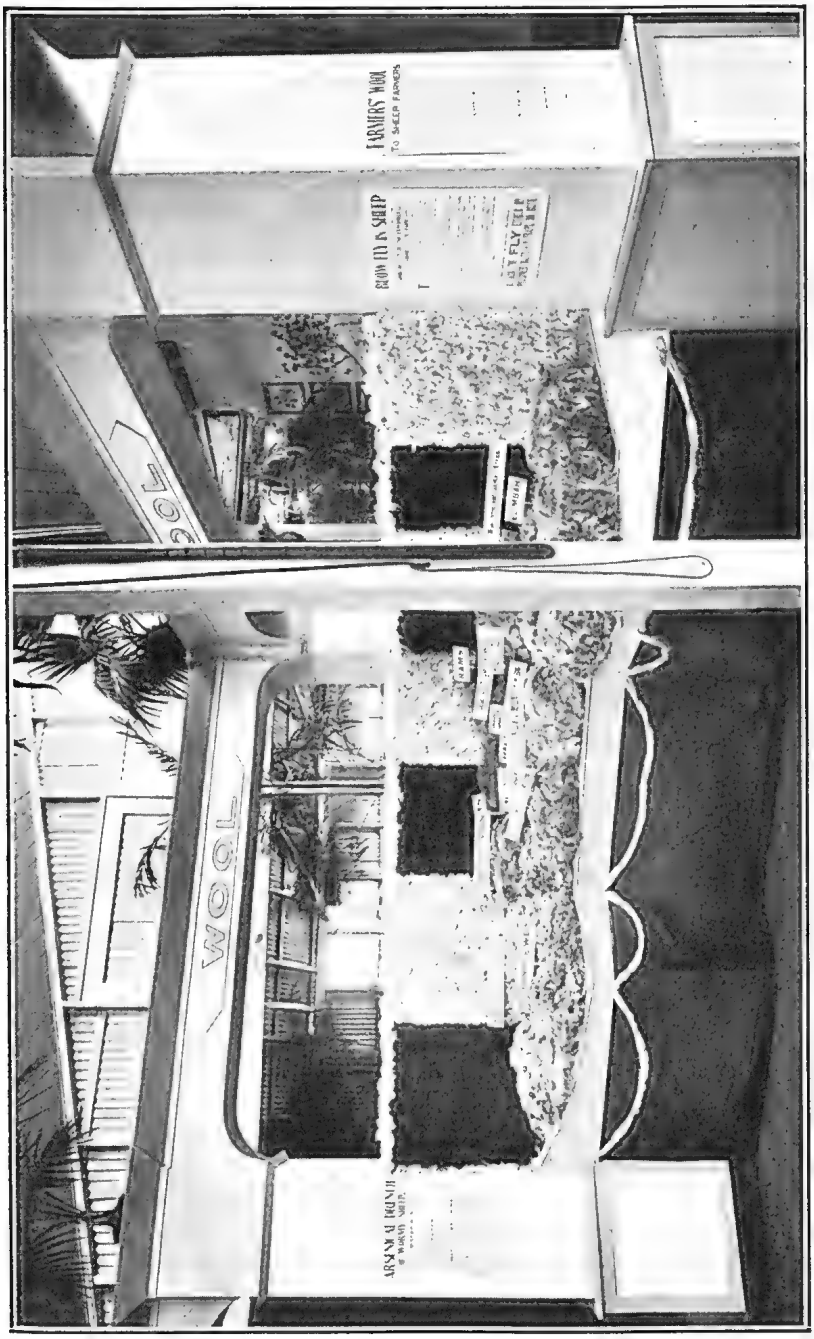

PLATE 12.—WOOL EXHIBIT, DEPARTMENT OF AGRICULTURE AND STOCK.

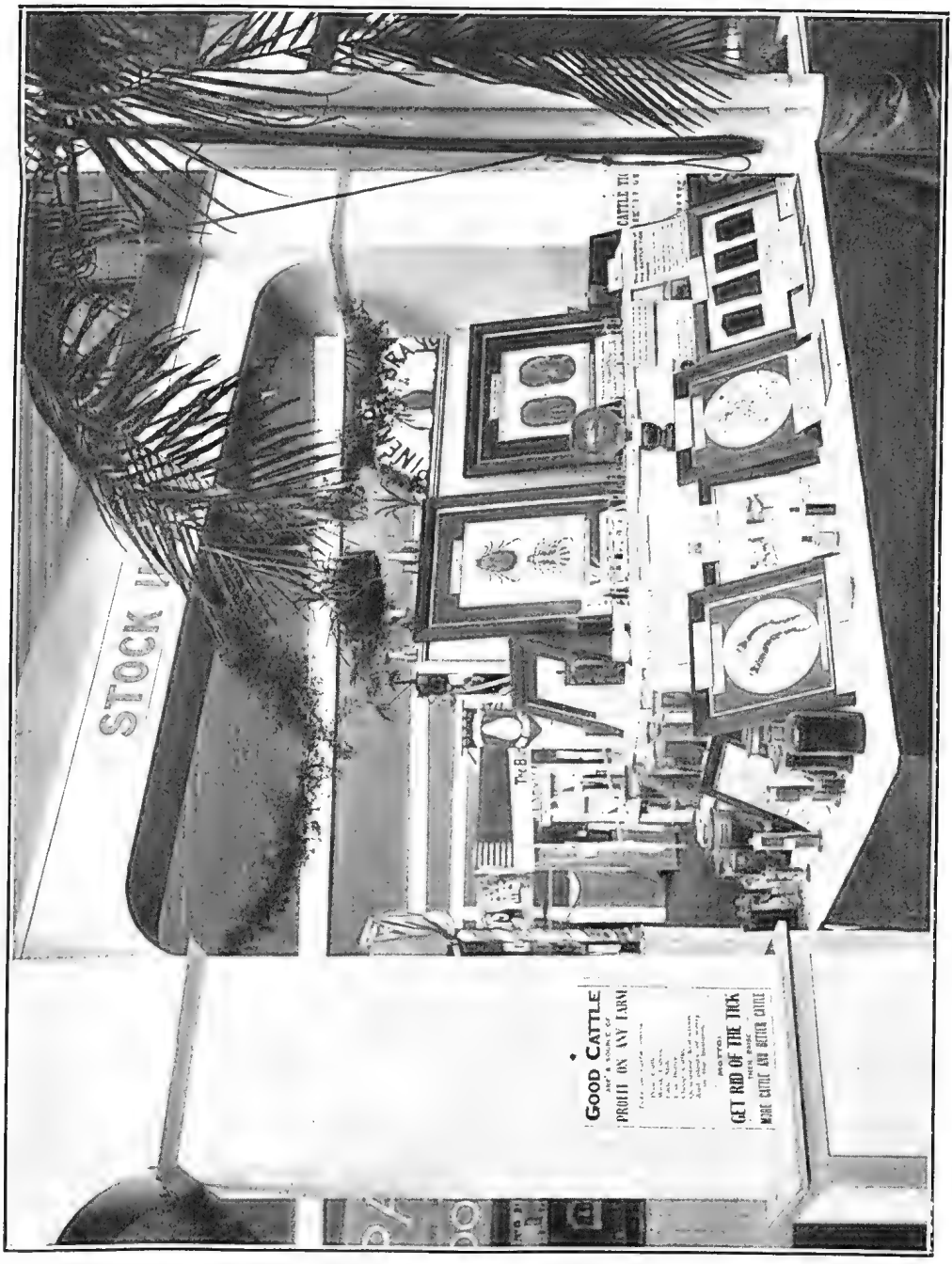

PLATE 13.—EXHIBIT OF THE STOCK INSTITUTE, YEERONGPILLY.

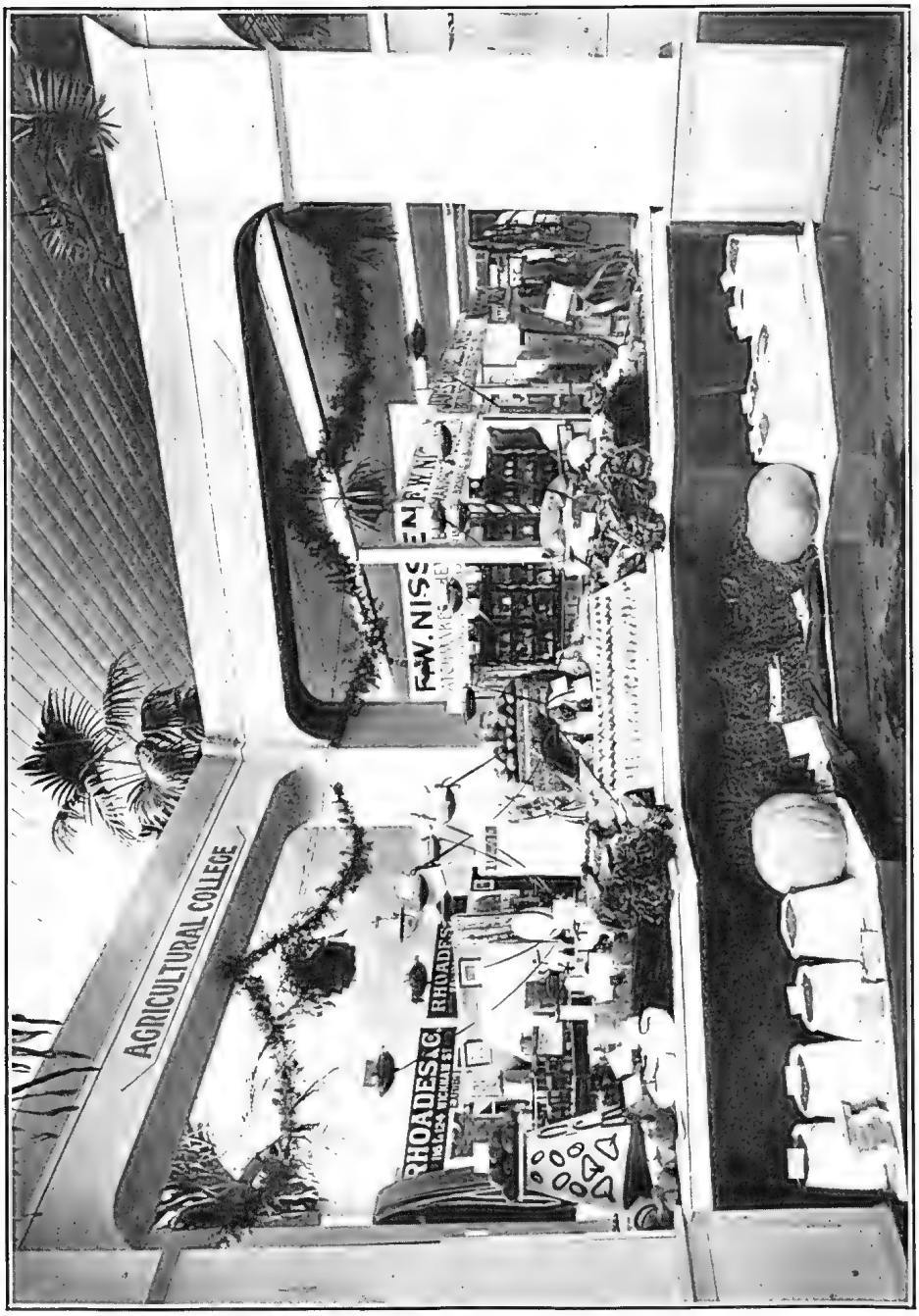

PLATE 14.—EXHIBIT OF PRODUCTS OF THE QUEENSLAND AGRICULTURAL COLLEGE.

produced latterly came from St. Helena and from two small plantations on the Northern Railway Line, near Gladstone. Both of these have now stopped work.

PRUNING FRUIT TREES AND VINES.

Amongst the most valuable educationary exhibits was one, showing the various methods of pruning, by Mr. C. Ross, Instructor in Fruit Culture. Very frequently, fruitgrowers and viticulturists seek information on this important question of pruning from the Department. Here the whole system, as far as vine-pruning is concerned and the pruning of various fruit trees, was clearly demonstrated, and, in the matter of vines, the various methods adopted for different varieties of the grape vine are shown by growing vines only lately pruned.

SUGAR-CANE AND SORGHUMS

of splendid quality were largely in evidence in most of the courts and in the exhibits of the Department of Agriculture, where all the latest and best varieties from the Experiment Station were on view. In spite of the dry weather at the commencement of the growing season, the cane generally made wonderful progress, so much so that it is expected that, notwithstanding labour troubles, the 1917 crop will pan out at about 400,000 tons of sugar. Some of the sorghums shown were of marvellous growth. One exhibit of Honduras giant sorghum showed a total height growth of quite 15 feet, if not more. Various other sorghums and millets were also on view.

WEEDS AND NATIVE GRASSES.

In the Agricultural Department's section there was, as at last year's Show, a very instructive exhibit of the various pestiferous weeds which have spread from time to time throughout the State. These included several varieties of prickly-pear, which pest, if no means are found of controlling its activity, will cause even greater loss of our best pastoral and agricultural lands than the 1,000,000 acres per annum now stated to be a dead loss to the State. We have no space to give details of all the weeds illustrated and described by the Acting Government Botanist, Mr. C. T. White. One, however, demands the attention of all engaged in farming and dairying. This is the prostrate-growing khaki weed, which found its way to South America from South Africa, and eventually arrived in Australia.

As a set-off to these pests, most of our more valuable native fodder grasses continue to spread and provide excellent fodder for station stock.

COTTON.

Both in the Departmental Court and in the District exhibits cotton held a prominent position, and it speaks well for the suitability of the soils and climates of far-sundered portions of the State that there were no inferior exhibits of this class of product. This season the State ginnery has already ginned and disposed of over 30,000 lb. of cotton, which was sold by tender at 11d. per lb., and, at the time of writing, farmers' cotton is still coming in to be ginned. We sincerely hope that farmers will realise the great value of a drought-resisting plant, which returns to the grower more net cash per acre than any other field crop.

PLATE 15.—AN OBJECT LESSON IN PRUNING VINES AND FRUIT TREES.

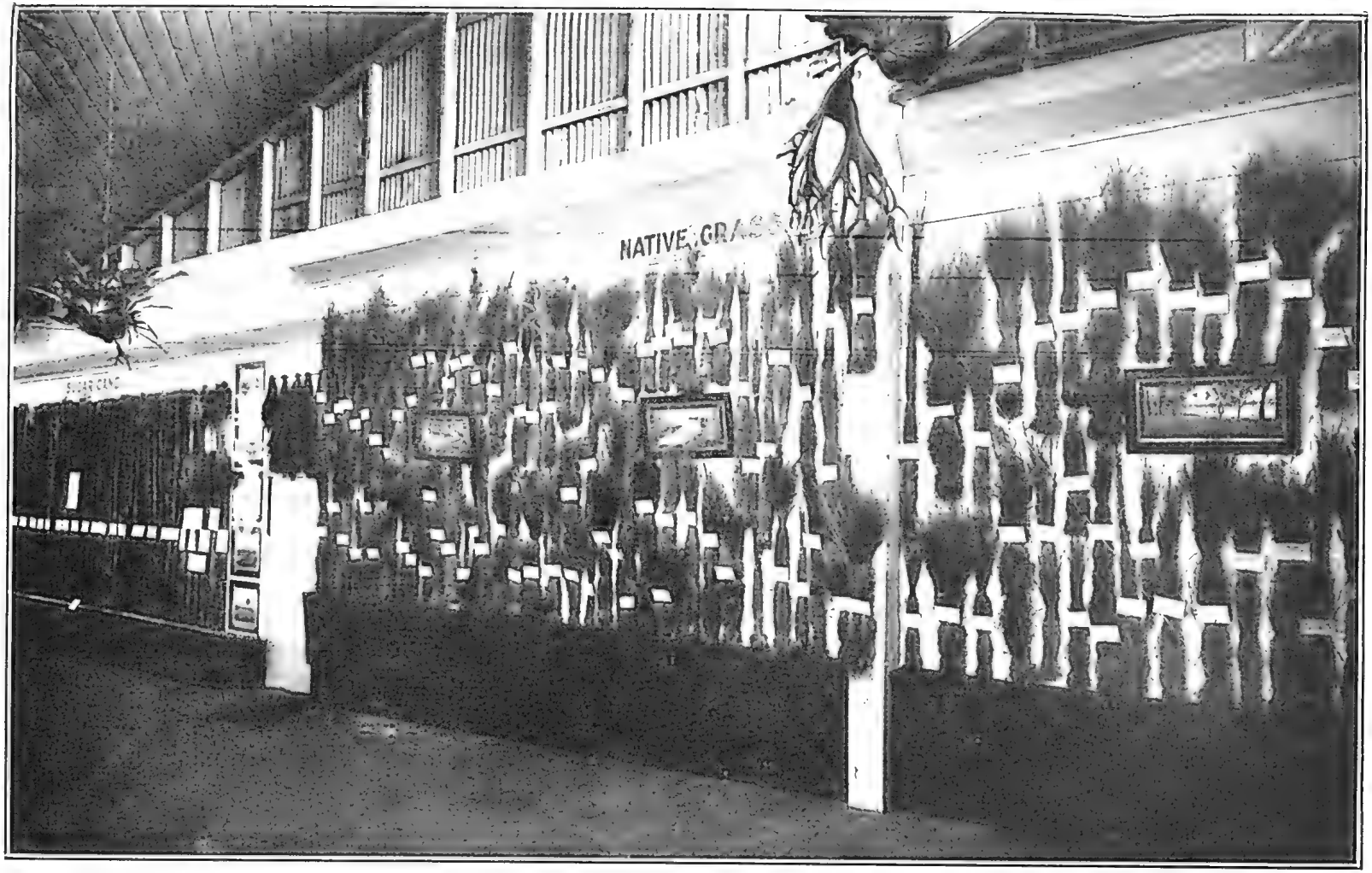

Plate 16.—Exhibit of Sugar-cane and Native Grasses.

PLATE 17.—THE WEEDS OF QUEENSLAND. EXHIBIT OF THE BOTANICAL GARDENS, BRISBANE.

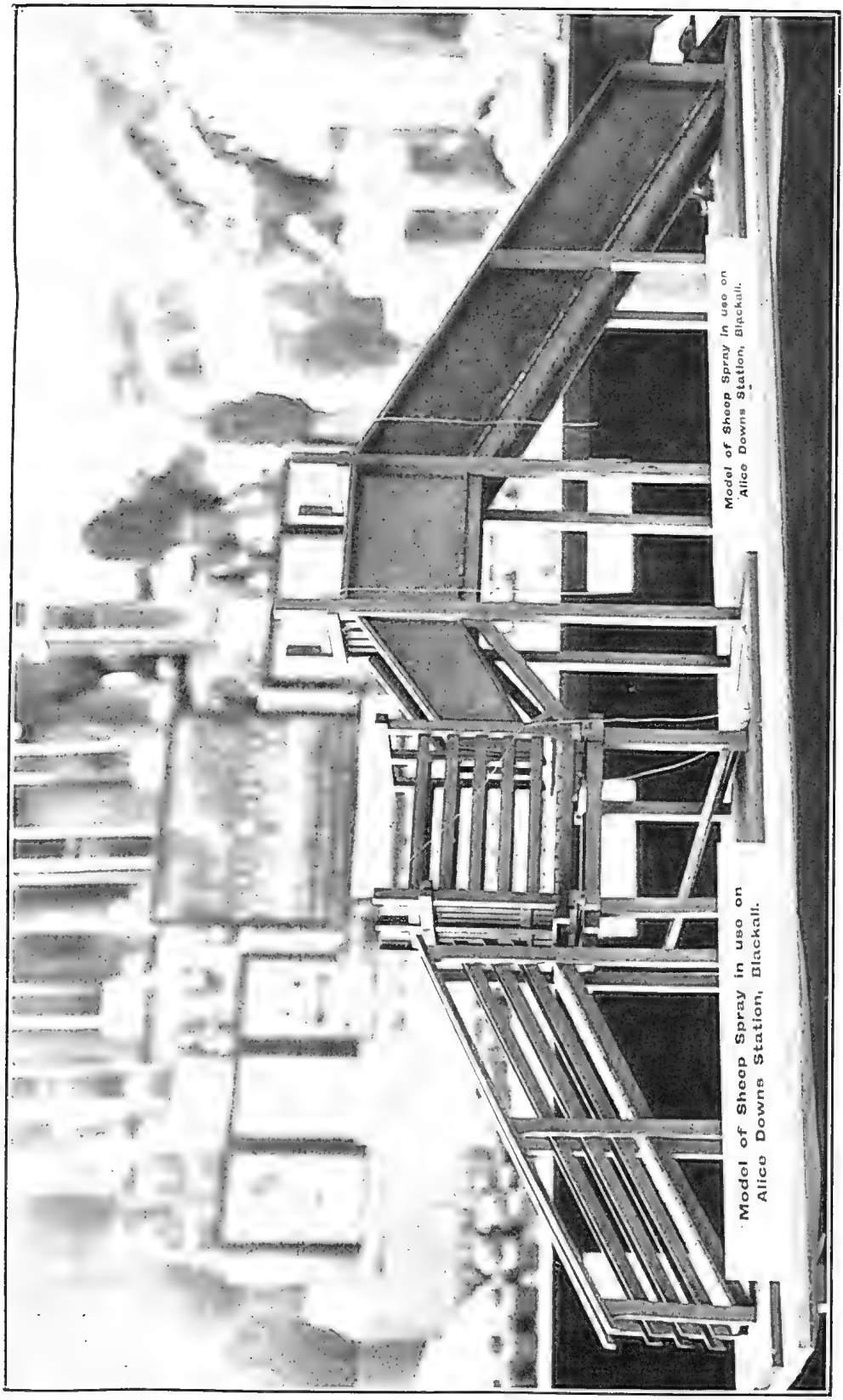

PLATE 18.—MODEL OF SHEEP SPRAY.

JUVENILE CORN-GROWERS' COMPETITION, 1916-1917.

This annual competition is open to boys and girls under 18 years of age, who must be residents of Queensland, and must do all the work from preparing the land (one-tenth of an acre) to gathering the harvest. The Department of Agriculture and Stock supplies selected seed free of charge. The competition is much appreciated by the young farmers, and at National Association's Exhibition the results which are on view are examined with much interest by country visitors. The results of the 1916-1917 competition have now been made available. Eighty-seven young people entered for the contest. Some of the results were very good; one grower produced at the rate 107·8 bushels per acre, and five others reached or exceeded 100 bushels per acre, notwithstanding unfavourable weather conditions, first by excessive rain, later on by dry weather, and next by the depredations of mice, whose attacks reduced some of the averages by 30 to 40 per cent., and caused some of the competitors to withdraw from the competition.

Following is the list of awards:—

No. 1 DISTRICT.

Name and Address of Competitor.	Age.	Yield per Acre. (Standard, 125 bushels). Maximum Points, 75.		Quality of Grain and Uniformity of Ear. Maximum points, 15.	Records. Field Data, 10 points.	Totals. Maximum points, 100.	District Prize.
A. C. Marshall, Alberton, *via* Yatala	13½	76·1	45·6	9	6	60·6	1st, £5
R. G. Morrison, Purga, *via* Ipswich	14	75·1	45·0	9·5	4·5	59·0	2nd, £2
W. E. Patterson, Glamorgan Vale, *via* Walloon	13	66·5	39·9	12	4	55·9	3rd, £1
A. R. Pegg, Warril Bank, Harrisville	16	59·8	35·8	11	3·5	50·3	..
A. V. Rachow, Alberton, *via* Yatala	14½	58·5	35·1	9	5	49·1	..
W. O. Griffiths, Mount Forbes, *via* Rosewood	14	48·8	29·2	8·5	9	46·7	..
John Osborne, Mt. Alford, *via* Boonah	12	57·6	34·5	6	4·5	45·0	..
E. P. H. Prenzler, Kulgun, *via* Ipswich	15	45·1	27·0	8	4	39·0	..
Gordon Osborne, Mt. Alford, *via* Boonah	15	44·4	26·6	8	2·5	37·1	..
A. G. Marks, Alberton, *via* Yatala	14½	35·4	21·2	8·5	5·5	35·2	..
D. S. Loudon, Ebenezer, *via* Rosewood	11½	13·6	8·1	5	2	15·1	..

No. 2 DISTRICT.

N. H. McGinn, Oakey Creek, *via* Eumundi	17	105·7	63·4	10	9·5	82·9	1st, £5
E. A. Sims, Gheerulla, *via* Eumundi	11¾	101·0	60·6	11·5	6	78·1	2nd, £2
W. J. Guldbransen, Samford ..	15	104·1	62·4	10	4	76·4	3rd, £1
J. S. Bray, Lawnton, N.C. Line	14	90·3	54·1	11	5·5	70·6	..
A. F. G. Pedwell, Samford ..	18	78·3	46·9	12	5	63·9	..
W. P. Pedwell, Samford ..	13	75·7	45·4	9	5	59·4	..
V. R. Ellis, Tuchekoi, *via* Cooran	13¾	60·3	36·1	9	5	50·1	..
F. B. Leembruggen, Samford ..	17½	38·9	23·3	8	8	39·3	..

N. H. McGinn also secured a Special Prize (the second), value £5.

No. 3 DISTRICT.

Name and Address of Competitor.	Age.	Yield per Acre. (Standard, 125 bushels). Maximum Points, 75.		Quality of Grain and Uniformity of Ear. Maximum points, 15	Records. Field Data, 10 points	Totals. Maximum points, 100.	District Prize.
T. A. Smoothy, Pinelands, Crow's Nest	13	107·8	64·6	11·5	9	85·1	1st, £5
V. Littleton, Pinelands, Crow's Nest	14¾	95·6	57·3	9	6	72·3	2nd, £2
G. Jannusch, Haden, *via* Toowoomba	16	84·8	50·8	9	3	62·8	3rd, £1

T. A. Smoothy also secured a Special Prize (the first), value £10.

No. 4 DISTRICT.

S. L. Marshall, Wooroolin ..	13¾	99·5	59·7	10	4	73·7	1st, £5
G. Maynard, Taabinga, *via* Kingaroy	13½	73·9	44·3	8	4	56·3	2nd, £2
L. J. Horne, Goomeri	15	61·3	36·7	11	5	52·7	3rd, £1
J. MacKenzie, Home Creek, *via* Tingoora	15	56·3	33·7	9	5·5	48·2	..
A. C. Ellwood, Memerambi ..	17	51·1	30·6	10	4	44·6	
W. C. Hansen, Wondai ..	13	49	29·4	9·5	4	42·9	..

No. 5 DISTRICT.

A. Wilkie, Killarney	14	96	57·6	9·5	3	70·1	1st, £5
H. Gow, Killarney	15	80·1	48·0	7·5	10	65·5	2nd, £2
Rachel Gow, Killarney ..	10	75·5	45·3	8	5	58·3	3rd, £1
C. Thies, Highfields, Toowoomba	13½	69·5	41·8	10	5	56·8	..
R. F. Watson, Summit, S. Line	15½	60·1	36·0	7	4·5	47·5	..
P. Madden, Killarney ..	13	48·7	29·2	8·5	6	43·7	..
A. T. Henderson, Summit, S. Line	17½	37·2	22·3	7	6	35·3	..

No. 6 DISTRICT.

F. H. C. Lieberam, Gurgeena, Gayndah	15	106·9	64·1	11	6	81·1	1st, £5

This Competitor also secured a Special Prize (the third), value £3; (no other competitors in district class).

No. 7 DISTRICT.

G. H. Kirstenfeldt, Rosalie Plns.	12½	56·9	34·1	7	2·5	43·6	1st, £5
D. J. Allen, Pelican, *via* Chinchilla	15	17·7	10·6	8	2·5	21·1	2nd, £2

No third prize awarded owing to lack of competition.

No. 8 DISTRICT.

H. M. McCamley, Bajool ..	17	104·8	62·8	8·5	3	74·3	1st, £5
C. E. McCamley, Bajool ..	15	99·3	59·5	9	3	71·5	2nd, £2
B. Philp, Bracewell, Mt. Larcom	15¾	78·2	46·9	11	3·5	61·4	3rd, £1
Mary Wilson, Mt. Rae, Yeppoon	15½	66·5	39·9	9·5	5·5	54·9	..
A. E. Nitz, Barmoya Settlement	14	58·9	35·3	10	3	48·3	..

No. 9 DISTRICT.

Keith Downs, Tarzali, *via* Malanda	12¾	97·5	58·5	9	4·5	72	1st, £5

No second and third prizes awarded owing to lack of competition.

DYES AND PAPERS FROM NATIVE PLANTS.

A most interesting and, under present war conditions, important exhibit was one by Mr. J. Campbell, of Cairns, in which the manufacture of paper from various fibrous plants indigenous to Queensland was practically described by the exhibition of the plant, of its fibre, and of the several processes the material underwent to produce the fine samples of good, tough, brown packing-paper. Also there was shown how a highly important industry could easily be established in the manufacture of dyes of various hues, even black (a difficult dye to produce). These dyes have all the characteristics of the aniline dyes, so largely imported from Germany previous to the war. Mr. Campbell has clearly shown that we need not be dependent on importation of these products, since it is quite possible to produce them in our own State.

THE DISTRICT EXHIBITS.

Last year, much additional interest attached to the competition in this class, owing to the fact that the Queensland Districts were challenged in A Grade by the Western Districts of New South Wales, which included such centres of population as Lithgow, Paramatta, Orange, Mudgee, Bathurst, Dubbo, and Penrith, when the prize was awarded to New South Wales, whose score was 874 points out of a possible 1,390. The only Queensland competitor (Queensland South Coast District) made such a creditable display as to come in only 22 points behind the winner.

This year there were three exhibits in the "A" Grade, the competitors being the Darling Downs, Wide Bay and Burnett, and the South Coast. It is fifteen years since Darling Downs competed in this section, and seven years have elapsed since the reappearance of the Wide Bay and Burnett District. In "B" Grade, four districts—Crow's Nest, Fassifern, Wallumbilla, and Gympie—competed.

In the "A" Grade, Darling Downs was successful with 1,037 points, Wide Bay scoring 904, and South Coast 800.

In "B" Grade, Crow's Nest won with 884 points. Fassifern took second honours with 856; Gympie, 785. Wallumbilla scored 661 points.

DISTRICT EXHIBITS OF FRUITS.

The competition for the district exhibits of fruit created considerable interest. There were four competitors—Buderim Mountain District, Caboolture District (including Woodford, Glasshouse Mountain to Landsborough), Palmwoods, and the Gympie District (from Cooran-Tewantin road to Gundiah). The exhibits were very creditable, and a fine advertisement for the fertility of the soil of the districts mentioned. The judge was Mr. A. W. Carseldine. The first prize was awarded to Buderim Mountain District, with 111 points out of a possible 170. Landsborough North was placed second, with 109, and the Caboolture District, with 108, was a very close third. The Gympie District only did fairly well, but may do better in future with the experience gained in

the competition. In addition to the prize money, National certificates were awarded as follows:—Caboolture, for pineapples; Landsborough North and District, for citrus fruit; and Buderim Mountain District, for bananas. In grading and packing of fruits exhibited in cases and general display the honours were secured by Caboolture and Landsborough North, which each secured 22 points out of the possible 30. The details of the award are as follow, the possible points being shown in parenthesis:—

	Points.	Buderim.	Landsborough.	Caboolture.	Gympie.
Bananas	25	20	18	16	16
Pineapples	25	14	17	20	12
Citrus fruits	25	18	23	18	12
Custard apples	10	5	2	3	..
Papaws	10	7	5	5	7
Strawberries	10	7	8	2	8
All other fruits	15	12	5	8	6
Home-made preserved fruits, bottled, canned, or dried; or as home-made jam	20	10	9	14	8
Grading, packing, and general display	30	18	22	22	12
TOTALS	170	111	109	108	81

ONE-FARM EXHIBITS.

The competition in this section always evokes much interest amongst the farming community, and it is to be regretted that more farmers do not compete. Last year there were three entries—Mr. O. C. Williams, Plainby, Crow's Nest (who won the first prize in 1915); Mr. J. A. Nystrom, of Booie, Kingaroy; and Mr. W. Allan, of Gympie. Mr. O. C. Williams was again successful in winning the first prize in 1916, and this year he again comes out the winner, after a keen contest with Mr. Nystrom, who was only 62 points behind. The points scored were as follow:—

	Possible.	Nystrom.	Williams.
DAIRY PRODUCE—			
Butter	25	15	12
Cheese	20	20	14
Eggs	5	5	3
	50	40	29
FOODS—			
Hams and bacon	20	15	10
Corned, smoked, and spiced beef and mutton	10	5	8
Honey	10	5	8
Beeswax	5	2	3
Bread and scones	5	4	4
Confectionery and sweets	5	2	4
Lard, tallow, oils	5	3	4
	60	36	41

	Possible.	Nystrom.	Williams.
FRUITS, VEGETABLES, AND ROOTS (fresh and preserved)			
Fresh fruits, all kinds	25	16	10
Dried fruits	10	5	8
Preserved fruits and jams	15	7	12
Fresh vegetables	15	7	7
Pickles, sauces, &c.	15	8	12
Potatoes and roots	25	13	18
Table pumpkins, squashes, and marrows	10	5	7
Cocoanuts and nuts	3	2	1
Vegetable and garden seeds	5	2	4
Arrowroot	5	4	3
Cassava	5	12	12
Ginger	5	12	3
Sugar beet	5	3	3
	143	96	100
GRAIN, &C.—			
Wheat	25	10	18
Maize	20	12	18
Barley	10	6	8
Oats, rye, and rice	15	7	10
	70	35	54
TROPICAL PRODUCTS—			
Sugar-cane	30	15	10
Cotton, in seed	10	7	6
Coffee	15	12	5
	55	34	21
TOBACCO, &C.—			
Tobacco, leaf, dried	10	6	7
HAY, CHAFF, ETC.—			
Hay, oaten, wheaten, lucerne, &c.	20	8	18
Grasses and their seeds	10	6	6
Chaff, oaten, wheaten, lucerne, &c.	20	10	18
Ensilage, any form	15	8	8
Cattle fodder (pumpkins and green fodder)	15	8	8
Sorghum and millet	10	8	6
Hemp	5	3	3
Flax	5	3	3
Cowpea seed	7	6	4
Broom millet	10	6	6
	117	66	80
WOOL—			
Greasy	20	15	15
Mohair	5	4	4
	25	19	19
DRINKS, ETC.—			
Temperance drinks	10	4	5
WOMEN'S AND CHILDREN'S WORK—			
Needlework, knitting, fine arts	10	5	7
School work—Maps, writing, &c.	10	3	3
Fancy work	10	8	10
	30	16	20
Miscellaneous articles of commercial value	5	3	4
Plants and flowers in pots	5	2	4
Time and labour saving useful articles made on the farm	10	12	6
Effective arrangement of exhibits	10	7	9
	30	24	23
TOTALS	600	325	387

BUTTER AWARDS.

The judging of the butter was completed on Tuesday, 14th August. The competitions were keen, but it is understood that generally the butter was not equal to the best that has been produced in Queensland. No doubt the adverse season has had a detrimental effect. The outstanding feature of the competitions has been the pronounced success of the Downs Co-operative Dairy Company's Toowoomba factory. This factory won the two first prizes in the unsalted classes. In export classes the company won first prize for eight weeks' storage, second prize for thirty days' storage, first prize for greatest aggregate in all classes, and first prize for box salted with Australian salt. The first prize for thirty days' storage was won by Dungog Co-operative Butter Company, Limited, Dungog (N.S.W.), who were placed second to the Downs in eight weeks' storage. The awards are as follow:—

ONE BOX, UNSALTED, FACTORY MADE.

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Downs Co-operative Dairy Company, Toowoomba	59½	19½	7	4	4	94
Maleny Co-operative Dairy Company ..	58	19½	7	4	4	92½
Stanley River Co-operative Company, Woodford	58½	19	7	4	3	91½
Queensland Farmers' Co-operative Co.—						
Booval	57½	19	7	4	3½	91
Boonah	56½	19½	7	4	4	91
Grantham	57	19	7	4	4	91
Laidley	56½	19	7	4	4	90½
Caboolture Co-operative Dairy Company	57	19	7	4	3½	90½
A. L. Frederich, Townshend	58	19	7	4	2½	90½
Silverwood, Gatton	57	19½	6½	4	3½	90½
Maryborough Co-operative Dairy Co.—						
Kingaroy	56½	19	7	4	3½	90
Biggenden	56½	19½	7	4	3	90
Mundubbera	56	18½	7	4	2½	88
Maryborough	53½	19½	7	4	3½	87½
Maclagan Valley Co-operative Dairy Co..	56	19	7	4	3½	89½
Kin Kin Co-operative Dairy Company ..	56½	19	7	4	3	89½
South Burnett Co-operative Dairy Co., Murgon	56½	19½	7	4	2½	89½
Wide Bay Co-operative Dairy Company, Cooroy	55	19	7	4	4	89
Logan and Albert Co-operative Dairy Co., Beaudesert	55	19	7	4	4	89
Singleton (N.S.W.) Central Co-operative Dairy Company	55	19	7	4	4	89
Queensland Agricultural College, Gatton	55	19½	6½	4	3	88
Terror's Creek and Samson Vale Co-operative Dairy Company	55	18½	7	4	3	87½
Goombungee Co-operative Dairy Company	53½	19	7	4	4	87½
Warwick Dairying Company—						
Allora	55	18½	6½	4	3½	87½
Texas	53	19	7	4	4	87
Millhill	55	18	7	4	3	87
Oakey Co-operative Dairy Company ..	52	19½	7	4	4	86½

ONE BOX FRESH, FACTORY MADE.

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Downs Co-operative Dairy Company, Toowoomba	60	19½	7	4	4	94½
Wide Bay Co-operative Dairy Company, Cooroy	59	19	6½	4	4	92½
Queensland Farmers' Co-operative Co.—						
Booval	58	19	7	4	4	92
Laidley	57½	19	7	4	4	91½
Boonah	57	19½	7	3½	4	91
Grantham	55	19	7	4	4	89
Maleny Co-operative Dairy Company ..	57½	19	7	4	4	91½
Stanley River Co-operative Dairy Co., Woodford	57	19	7	4	3	90
A. L. Frederich, Townshend	57½	19	7	4	2½	90
Maclagan Valley Co-operative Dairy Co.	56½	19	7	3½	3	89
Silverwood, Gatton	54½	19½	7	4	3½	88½
Goombungee Co-operative Dairy Company	54	19½	7	4	4	88½
Caboolture Co-operative Dairy Company	55	19	7	4	3½	88½
Maryborough Co-operative Dairy Co.—						
Maryborough	55	19	7	4	3½	88½
Kingaroy	56	19	7	3	3½	88½
Mundubbera	56	19	6½	4	3	88½
Biggenden	53½	19	6	4	3½	86
Warwick Dairying Company—						
Texas	53½	19½	7	4	4	88
Millhill	56	18	7	4	3	88
Allora	55	18½	6½	4	3½	87½
Logan and Albert Co-operative Dairy Co., Beaudesert	54	19	7	4	4	88
Singleton (N.S.W.) Central Co-operative Dairy Company	54	19½	6½	4	4	88
Kin Kin Co-operative Dairy Company ..	55	19	7	3½	3	87½
Queensland Agricultural College, Gatton	54½	19½	6½	4	3	87½
Oakey Co-operative Dairy Company ..	53	19	7	4	4	87
South Burnett Co-operative Dairy Co., Murgon	55	19	6	4	2½	86½
Terror's Creek and Samson Vale Co-operative Dairy Company	54	18	7	3	2½	84½

EXPORT BUTTER—ONE BOX, THIRTY DAYS' STORAGE.

Dungog (N.S.W.) Co-operative Dairy Co.	61	20	7	4	4	96
Downs Co-operative Dairy Company, Toowoomba	61	19½	7	4	4	95½
Singleton (N.S.W.) Central Co-operative Dairy Company	60	19½	7	4	4	94½
Goombungee Co-operative Dairy Company	57	19½	7	4	4	91½
Queensland Farmers' Co-operative Co.—						
Grantham	57	19	7	4	4	91
Laidley	57	19	7	4	4	91
Booval	56	19	6½	4	4	89½
Boonah	55½	19	6½	4	4	89
Maleny Co-operative Dairy Company ..	66	19½	7	4	4	90½
Silverwood, Gatton	57	19	6½	4	4	90½
Logan and Albert Co-operative Dairy Company, Beaudesert	57	18½	6½	4	4	90
Warwick Dairying Company—						
Texas	56	19	6½	4	4	89½
Allora	56½	19½	6	4	3½	89½
Millhill	56½	19	6½	4	3½	89½
Gayndah Co-operative Dairy Company ..	54½	19½	7	4	4	89
Downs Co-operative Dairy Company, Clifton	55	19½	6½	4	3½	88½

EXPORT BUTTER—ONE BOX, THIRTY DAYS' STORAGE—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Caboolture Co-operative Dairy Company	54½	19	7	4	3½	88
Queensland Agricultural College, Gatton	54½	19½	6½	4	3½	88
South Burnett Co-operative Dairy Company, Murgon	55	19	7	3½	3	87½
Maryborough Co-operative Dairy Co.—						
Kingaroy	55	18½	7	3½	3½	87½
Mundubbera	53½	18½	6½	3½	3½	85½
Biggenden	53½	18	6	3	3½	84
Maclagan Valley Co-operative Dairy Company	54	18½	7	4	3½	87
Oakey Co-operative Dairy Company ..	54	18½	6½	4	4	87
A. L. Frederich, Townshend	55	18½	6½	4	3	87
Wide Bay Co-operative Dairy Company, Cooroy	54½	18	6	4	4	86½
Terror's Creek and Samson Vale Co-operative Dairy Company	54	18½	5½	4	4	86
Stanley River Co-operative Dairy Company, Woodford	53½	18½	6½	4	3½	86
Kin Kin Co-operative Dairy Company ..	53	18	6	4	3½	84½
Roma Co-operative Dairy Company ..	55	19	6½	..	3½	84
ONE BOX, EIGHT WEEKS' STORAGE.						
Downs Co-operative Dairy Company, Toowoomba	60	20	7	4	4	95
Dungog (N.S.W.) Co-operative Dairy Company	59½	20	7	4	4	94½
A. L. Frederich, Townshend	58	19½	7	4	3½	92
Wide Bay Co-operative Dairy Company, Cooroy	56½	19½	7	4	4	91
Goombungee Co-operative Dairy Company	56½	19	7	4	4	90½
Warwick Dairying Company—						
Texas	56½	19½	7	4	3½	90½
Goondiwindi	56	19	7	3½	3½	89
Allora	54½	19½	7	4	3½	88½
Millhill	55	18½	6½	4	4	88
Queensland Farmers' Co-operative Co.—						
Grantham	56	19	6½	4	4	89½
Laidley	56	19	6½	4	4	89½
Boonah	54½	18½	6½	4	4	87½
Booval	53	18	6	4	3½	84½
Maclagan Valley Co-operative Dairy Company	55	19½	7	4	3½	89
Killarney Dairying Company	55	19	7	4	4	89
Caboolture Co-operative Dairy Company	54½	19½	7	4	3½	88½
Queensland Agricultural College, Gatton	55	19½	6½	4	3½	88½
Maleny Co-operative Dairy Company ..	54½	19	6½	4	4	88
Stanley River Co-operative Dairy Company, Woodford	55	18½	7	4	3½	88
Oakey Co-operative Dairy Company ..	54	18½	7	4	4	87½
Gayndah Co-operative Dairy Company ..	54	19	6½	4	4	87½
Silverwood, Gatton	54½	19	6½	4	3½	87½
Maryborough Co-operative Dairy Co.—						
Kingaroy	55	19	6½	4	3	87½
Mundubbera	54½	19	6½	4	3½	87½
Maryborough	53	18½	6	4	3	84½
Biggenden	53	18	6	3½	3½	84
Kin Kin Co-operative Dairy Company ..	54	19	7	4	3½	87½
Logan and Albert Co-operative Dairy Company, Beaudesert	54	19	6½	4	3½	87

ONE BOX, EIGHT WEEKS' STORAGE—*continued.*

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Possible points	65	20	7	4	4	100
Terror's Creek and Samson Vale Co-operative Dairy Company ..	53	19	6	4	3	85
Roma Co-operative Dairy Company ..	55	18½	6½	..	3½	83½
South Burnett Co-operative Dairy Company, Murgon	52	18½	6	3	3	82½
ONE BOX SALT BUTTER SALTED WITH AUSTRALIAN SALT.						
Downs Co-operative Dairy Company, Toowoomba	60	19½	7	4	4	94½
Wide Bay Co-operative Dairy Company, Cooroy	59	19	6½	4	4	92½
Queensland Farmers' Co-operative Co.—						
Booval	58	19	7	4	4	92
Boonah	56½	19½	6½	4	4	90½
Grantham	55	19½	7	4	4	89½
Laidley	56	19½	7	4	4	90½
Terror's Creek and Samson Vale Co-operative Dairy Company	54½	18½	6½	4	3	86½
Goombungee Co-operative Dairy Company	57	19½	7	4	4	91½
Warwick Dairy Company—						
Texas	54½	19½	7	4	4	89
Allora	56	19	6½	4	3	88½
Millhill	56	19	7	4	3½	89½
Maclagan Valley Co-operative Dairy Company	54½	19	7	4	3½	87½
Oakey Co-operative Dairy Company ..	53	19½	7	4	4	87½
Maleny Co-operative Dairy Company ..	57½	19	7	4	4	91½
Kin Kin Co-operative Dairy Company ..	53½	19	6	4	3	85½
Logan and Albert Co-operative Dairy Company, Beaudesert	54	19	7	3½	4	87½
A. L. Frederich, Townshend	57	18	7	4	2½	88½
Queensland Agricultural College, Gatton	54½	19½	6½	4	3½	88
South Burnett Co-operative Dairy Company, Murgon	55	19	6	4	3	87
Singleton (N.S.W.) Central Co-operative Dairy Company	54	19½	6½	4	4	88
Maryborough Co-operative Dairy Co.—						
Maryborough	56	19	6½	4	3½	89
Kingaroy	57½	19	7	4	3½	91
Biggenden	54½	19	6	4	3½	87
Mundubbera	56	18½	6½	4	3½	88½

GREATEST AGGREGATE, ALL CLASSES AND SPECIALS.

Downs Co-operative Dairy Company, Limited, Toowoomba, 473½ points.

MILKING TESTS.

THE RESULTS.

The prizes were awarded according to the following scale:—One point for every ounce of commercial butter in twenty-four hours, taking the average of forty-eight hours' yield; one point for every completed ten days since calving, deducting the first forty days. Maximum allowance of lactation, ten points. Fractions of ounces of commercial butter

and incomplete periods of less than ten days to be worked out in decimals and added to the total points. In addition a declaration may be required to the effect that the cow has not broken her service during the lactation period.

COW, 4 YEARS AND OVER, AVERAGING GREATEST DAILY YIELD OF BUTEER FAT IN FORTY-EIGHT HOURS.

——	—	Milk. Lb.	Test.	Butter.	Total, 48 Hours.
Marquardt Bros.' Champion (Illawarra), 47·52 points (1)	M.	19·13	14·7	1·08	
	E.	19·6	5·7	1·30	
	M.	19·5	5·2	1·22	
	E.	18·1	5·1	1·09	
Nestle's Maggie 2nd of Numba (Holstein), 44·8 points (2)	M.	34·5	3·2	1·27	
	E.	31·2	4·3	1·57	
	M.	33·6	3·2	1·24	
	E.	30·02	4·3	1·52	
H. Benbow's Joyce, 41·58 points (3) ..	M.	27·0	3·1	·97	
	E.	28·10	4·0	1·32	
	M.	30·10	3·5	1·25	
	E.	27·14	3·9	1·27	

COW, 4 YEARS AND OVER, AVERAGING QUALITY AND DAILY YIELD OF BUTTER FAT FOR FORTY-EIGHT HOURS, NO LACTATION TEST.

Nestle's Maggie 2nd of Numba, 44·8 points (1)	M.	34·5	3·2	1·27	
	E.	31·2	4·3	1·57	
	M.	33·6	3·2	1·24	
	E.	30·2	4·3	1·52	
H. Benbow's Joyce, 38·48 points (2) ..	M.	27·0	3·1	·97	
	E.	28·10	4·0	1·38	
	M.	30·10	3·5	1·25	
	E.	27·14	3·9	1·27	
Marquardt Bros.' Dairymaid, 32·64 points (3)	M.	21·8	3·7	·93	
	E.	21·7	4·2	1·05	
	M.	19·9	3·3	·75	
	E.	21·6	5·4	1·35	

COW OR HEIFER, UNDER 4 YEARS, NO LACTATION TEST.

B. O'Connor's Stella 2nd of Hillview, 37·21 points (1)	M.	23·12	3·8	1·06	
	E.	22·7	4·4	1·15	
	M.	23·6	4·3	1·17	
	E.	21·10	5·0	1·27	
Marquardt Bros.' Canary, 30·96 points (2)	M.	19·6	4·3	·97	
	E.	18·10	4·5	·98	
	M.	20·7	3·9	·93	
	E.	18·9	4·6	·97	
A. T. Waters's Favourite of Railway View, 30·32 points (3)	M.	23·2	3·8	1·04	
	E.	22·3	3·9	1·01	
	M.	21·5	2·9	·71	
	E.	23·4	4·0	1·03	

COW OR HEIFER, UNDER 4 YEARS, AVERAGING GREATEST DAILY YIELD OF BUTTER FAT FOR FORTY-EIGHT HOURS.

Marquardt Bros.' Canary, 34·06 points (1)	M.	19·6	4·3	·97	
	E.	18·10	4·5	·98	
	M.	20·7	3·9	·93	
	E.	18·9	4·6	·99	

COW OR HEIFER, UNDER 4 YEARS, ETC.—*continued.*

	—	Milk. Lb.	Test.	Butter.	Total, 48 Hours.
E. Burton's Oxford Golden Girl, 33·2 points (2)	M.	18·6	4·0	·86	
	E.	16·5	4·6	·88	
	M.	17·13	4·3	·90	
	E.	16·6	4·2	·81	
A. T. Waters' Favourite of Railway View, 30·32 points (3)	M.	23·2	3·8	1·04	
	E.	22·3	3·9	1·01	
	M.	21·5	2·9	·71	
	E.	22·4	4·0	1·03	

COW, YIELDING LARGEST SUPPLY OF MILK IN FORTY-EIGHT HOURS.

Nestle's Maggie 2nd of Numba, 128·15 points (1)	M.	31·5	..	..	
	E.	31·2	..	..	
	M.	33·6	..	..	
	E.	30·2	..	..	
H. Benbow's Joyce, 114·2 points (2) ..	M.	27·0	..	..	
	E.	28·10	..	..	
	M.	30·10	..	..	
	E.	27·14	..	..	
M. Lawrence's Model of City View, 65·13 points (3)	M.	15·11	..	..	
	E.	16·9	..	..	
	M.	16·6	..	..	
	E.	17·3	..	..	

Special prize under similar conditions, Maggie 2nd of Numba.

NATIONAL CHAMPION BUTTER FAT TEST.

(Brisbane Newspaper Co.'s special prize of £25, to be won thrice, and cash prize of £2 2s. to each year's winner), for cow averaging greatest daily yield of butter fat for forty-eight hours, under Babcock test.

Marquardt Bros.' Champion, 47·52 points (1)	M.	19·13	4·7	1·08	
	E.	19·6	5·7	1·30	
	M.	19·15	5·2	5·2	
	E.	18·1	5·1	5·1	
Nestle's Maggie 2nd of Numba, 44·8 points (2)	M.	34·5	3·2	1·27	
	E.	31·2	4·3	1·57	
	M.	33·6	3·2	1·24	
	E.	30·2	4·3	1·52	
H. Benbow's Joyce, 41·58 points (3) ..	M.	27·0	3·1	·97	
	E.	28·10	4·0	1·32	
	M.	30·10	3·5	1·25	
	E.	27·14	3·9	1·27	

HOME MILKING TEST.

Various Breeds.

M'Intyre Bros.' Handsome (1)	M.	28½	3·6	1·29	
	E.	29¼	4·6	1·57	
	M.	27½	4·0	1·28	
	E.	27¾	4·2	1·36	5·50

Holsteins.

Maggie 2nd of Numba (1)	M.	26¼	3·55	1·10	
	E.	23½	4·9	1·35	
	M.	27	3·5	1·10	
	E.	22	4·7	1·21	4·76

HOME MILKING TEST—*continued.*

		Milk. Lb.	Test.	Butter.	Total, 48 Hours.
Nolly 1st of Kabbinokka (2)	M.	30	2·6	·90	
	E.	26½	4·0	1·23	
	M.	29½	3·0	1·02	
	E.	25	3·9	1·14	4·29
Jerseys.					
W. J. Affleck's Golden Lily II. of Grasmere (1)	M.	23·5	5·3	1·46	
	E.	24·0	4·4	1·25	
	M.	23·0	5·9	1·60	
	E.	23·5	4·6	1·26	5·56
W. J. Affleck's Floss 6th of Grasmere (2)..	M.	15·5	6·3	1·14	
	E.	14·5	5·4	·92	
	M.	13·75	5·4	·87	
	E.	16·0	4·8	·90	3·83
Ayrshires.					
F. A. Stimpson's Pretty Maid of Harelmar (1)	M.	35	4·55	1·89	
	E.	34	5·60	2·25	
	M.	36	4·50	1·90	
	E.	37	5·45	2·40	8·44
F. A. Stimpson's Tina of Coolangatta (2)	M.	31	4·15	1·50	
	E.	28	4·45	1·46	
	M.	31	4·35	1·58	
	E.	34	4·25	1·69	6·23
F. A. Stimpson's Model of Harelmar (3) ..	M.	33	4·25	1·67	
	E.	31	3·87	1·40	
	M.	33	4·0	1·54	
	E.	30	3·3	1·15	5·76
J. W. Paten's Jean (4)	M.	25½	3·9	1·16	
	E.	22	4·4	1·13	
	M.	26	3·8	1·16	
	E.	22	4·5	1·17	4·62
Illawarras.					
*M. Marquardt's Champion (1)	M.	23¾	4·0	1·10	
	E.	23½	5·1	1·41	
	E.	23	5·9	1·04	
	M.	20½	5·2	1·25	
	M.	22½	4·6	1·215	
	E.	23¾	5·0	1·397	7·412
B. O'Connor's Charm of Glenthorne (2) ..	M.	35	4·3	1·76	
	E.	29	4·8	1·64	
	M.	34	3·8	1·57	
	E.	30	4·5	1·59	6·49
B. O'Connor's Blue Belle (3)	M.	24	4·05	1·15	
	E.	23	8·2	1·60	
	M.	25	5·1	1·50	
	E.	21·5	4·9	1·235	5·470
B. O'Connor's Fairy Queen II. (4) ..	M.	30·5	4·35	1·55	
	E.	24	4·7	1·32	
	M.	26	3·8	1·16	
	E.	25	3·9	1·14	5·17

* Early and late milkings shown.

PIG AWARDS.

Boars (Judge, H. M. Warburton, Mittagong, N.S.W.).—Improved Berkshires: boar, 2 years and over, Macfarlane Brothers' Onward 1, Goodna Hospital for Insane's Goodna Serang 2. Year and under 2, W. J. Warburton's Northgate Model Count 1, Queensland Agricultural College's Red Knight 2. Six months and under 1 year, Macfarlane Brothers' Conargo Invincible 1, Goodna Hospital for Insane's Barney 2. Under six months, W. J. Warburton's Northgate Romper 1, Dunwich Benevolent Asylum 2. Family group, boar and two of progeny: Goodna Hospital for Insane's Goodna Serang 1, Macfarlane Brothers' Onward 2. Champion: Macfarlane Brothers' Onward.

Sows.—Improved Berkshires, 2 years and over: Goodna Hospital for Insane's Goodna Lavina 1, Macfarlane Brothers' Miss Request 2. Year and under 2: W. J. Warburton's Northgate Queen 1, Queensland Agricultural College's Conceit 2. Six months and under year: W. J. Warburton's Northgate Empress 1, Goodna Asylum's Lady Bell 2. Under 6 months: Goodna Asylum's Goodna Polly 1, W. J. Warburton's Northgate Blossom 2. Any age, litter not over 6 weeks old: W. J. Warburton's Northgate Happy Emperor 1, Gatton College's Vanity Fair 2. Champion: W. J. Warburton's Northgate Queen.

Yorkshires.—Boar, over 2 years: W. J. Warburton's Rupert's Pride. Six months and under year: Gatton College's Gatton Snow King. Under 6 months: W. J. Warburton's Northgate Roger. Champion: W. J. Warburton's Rupert's Pride. Sow, over 2 years: W. J. Warburton's Northgate Snowflake and Rupert's Fancy 1 and 2. Year and under 2: W. J. Warburton's Northgate Duchess. Six months and under year: W. J. Warburton's Northgate Laura and Northgate Ruby 1 and 2. Under 6 months: W. J. Warburton's Northgate Pearl. Champion: W. J. Warburton's Northgate Duchess.

Tamworth.—Boar, 2 years and over: D. W. Evans's Royal King. Six months and under 1 year: D. W. Evans's Indian Prince 1, Dunwich Benevolent Asylum 2. Under 6 months: D. W. Evans's Sunbeam. Champion: Dunwich Benevolent Asylum. Sow, over 2 years: D. W. Evans's Indian Queen. Year and under 2: D. W. Evans's Knowles Queen. Six months and under year: Dunwich Benevolent Asylum 1 and 2. Under 6 months: D. W. Evans's Princess Knowle. Champion: D. W. Evans's Knowles Queen.

Miscellaneous.—Three bacon pigs, 100 lb. to 150 lb.: J. J. Fitzgerald 1, C. Bright 2. Any breed or cross, from 120 lb. to 150 lb.: H. B. Baldwin 1, W. J. Warburton 2. Three porker pigs, 60 lb. to 80 lb.: W. J. Warburton 1, Queensland Agricultural College 2. Sow, with litter, not over 6 weeks: Wm. Geo. Osborne.

FARM AND DAIRY PRODUCE.

(Judge, R. E. Soutter, Roma.)

Cereals.—Milling wheat: E. J. Anderson. Any other variety: E. J. Anderson 1, J. Brosnan 2. Milling barley: F. Franke. 90-day maize, any variety: C. Behrendorff. White: A. Loweke 1, Jas. Barbour, junr., 2. Early Leaming: John Stenzel. Yellow, horsetooth: John Stenzel 1, C. Behrendorff 2. Yellow, Dent: C. S. Huxley 1, A. Loweke 2. Any other yellow variety: Day and Bridge 1, C. S. Huxley 2. White: C. Behrendorff 1, John Fielding 2. Oats, Algerian: John Fielding 1, J. E. Stanton 2. Rye, millet (giant and white): John Fielding. Millet, imphee: C. Behrendorff. Cow peas, brown: C. S. Huxley. Black: C. Behrendorff 1, John Fielding 2. Any other variety: John Fielding. Canary, 50 lb.: Thos. W. Glasheen.

Potatoes (blue varieties).—Circular Heads: John Young. Guyra, Coronations, or Commonwealths: A. J. Moon 1 and champion, A. Loweke 2. Manhattans: A. Loweke. Brownell varieties—true to name: H. Franke. Peach bloom: H. Franke. Satisfaction: A. J. Moon 1 and champion, H. Franke 2. Queen of Valley: A. Loweke. White varieties —Carmens: Joseph Sinnamon 1 and 2. Scottish Triumphs: George Spiller 2, no first. Up to Date: H. Franke. Collection: H. Franke 1, A. Loweke 2. Sweets, white table: James Barbour, junr., 1, J. C. Butler 2. Cattle: James Barbour, junr. Red, table: J. C. Butler. Crown pumpkins: J. E. Stanton 1, John Fielding 2. Ironbark: J. C. Butler. Bugle: John Fielding.

Hay, Chaff, and Ensilage.—Lucerne hay: Charles Baulch 1, H. Franke 2. Oaten and panicum: H. Franke. Lucerne chaff: Charles Baulch 1, J. E. Stanton 2. Oaten: W. T. Beverley 1, John Williamson 2. Panicum, giant and white: John Fielding. Panicum, Japanese: H. Franke. Wheaten hay: George Hands 1, John Fielding 2. Rhoades: John Fielding 1, H. Franke 2. Rye: John Fielding. Canary: H. Franke. Mixed, lucerne and oaten: Charles Baulch 1, J. E. Stanton 2. Mixed lucerne and wheaten: John Fielding 1, C. S. Huxley 2. Lucerne and panicum: John Fielding 1, H. Franke 2.

Grasses.—Any other variety: H. Edser.

Bacon, Etc.—Six sides (factory cured), hams (factory cured), sausage, and lard: J. C. Hutton Proprietary, Ltd., won all the prizes. Hen eggs: Mrs. R. Loff 1, Mrs. A. Wyllie 2.

YOUNG JUDGES' COMPETITION.

Open to young farmers or farmers' sons and others, 25 years of age and under.

Swine (Judge, A. Moles, Bald Hills).—Leslie Arthur Warburton, Northgate, 1; David A. Logan, Bundamba, 2. The judge remarked as follows:—"In reference to this section I expected to see a greater number of young men competing. Those that came before me had a fair knowledge of their work. I would suggest that the Association encourage this section."

QUEENSLAND CHAMBER OF AGRICULTURAL SOCIETIES.

Minutes of the Annual Meeting of the Queensland Chamber of Agricultural Societies, held in the National Assocation's Council Room, Show Grounds, Brisbane, on Wednesday, 15th August, 1917, at 7.30 p.m.

Mr. John Macdonald (President) occupied the chair. His Excellency, Sir Hamilton J. Goold-Adams, was present, also the Minister for Lands, Hon. J. M. Hunter, and Mr. E. G. E. Scriven (Under Secretary, Department of Agriculture and Stock). Others present included Messrs. W. J. Affleck (Hon. Treasurer), G. H. Pritchard (Vice-President, representing Charters Towers), R. S. Archer, F. W. De Little, and H. Hill (Rockhampton), Ernest Baynes (Blackall), C. J. Booker, M.L.A. (Maryborough and Kilkivan), A. C. Thompson (Dalby), J. A. Pardy (Rosewood), J. P. Bottomley (Ipswich), A. J. M. Chapman (Noosa), Thos. Chappell (Charters Towers), J. N. Parkes (Townsville), R. P. Watson (Ipswich), M. Gleeson and E. Thorne (Clifton), D. Wildermuth (Toombul), W. J. Johnston (Pine Rivers), F. Shaw (Caboolture), S. Holmes (Pittsworth), A. B. Marquis (Zillmere), W. J. Lacey and A. W. Kirkley (Gayndah), W. A. A. Bates (Biggenden), W. M. Charles (Maryborough), J. Dean (Allora), Donald Gunn, M.L.A. (Goondiwindi), Gerard Noble (Toowoomba), B. J. Stark (Southern Queensland—Beenleigh), T. B. Murray-Prior (Fassifern), S. P. Fraser (Barcaldine), J. Hiron (Lowood), D. McIntyre (Goombungee), Chas. Baulch (Laidley), and J. Bain (Hon. Secretary).

An apology for non-attendance was received from Hon. W. Lennon, Minister for Agriculture.

President's Address.—The President, in opening the meeting, expressed pleasure at seeing such a large and representative gathering. He had pleasure in announcing that since their last meeting six more societies had affiliated, the membership of the Chamber now totalling 61 societies. He considered that this was good evidence that the work done by the executive was appreciated by agricultural societies. He briefly reviewed the annual report, and stated that they were very pleased to have His Excellency the Governor with them. It showed that His Excellency took a keen interest in the work of the Chamber when he came to spend the evening with them after having had such a strenuous day. They also had with them the Minister for Lands, Mr. Hunter, who had hardly missed a meeting since they had started, and they were always pleased to see him.

Minutes of the previous meeting having been previously circulated amongst members were taken as read and confirmed.

ANNUAL REPORT AND HON. TREASURER'S FINANCIAL STATEMENT.

The report and balance-sheet, which had been circulated amongst members and delegates, was taken as read and adopted. The financial report showed that receipts since last meeting had amounted to £78 5s. 8d., and expenditure £55 8s. 1d., leaving a credit balance in the

Government Savings Bank of £113 17s. 1d. Mention was made in the report of the arrangement made on behalf of affiliated societies with the Commissioner for Insurance by which, instead of every exhibitor being compelled to insure his riders and drivers in ring events at a cost of 5s. per day, the societies relieved exhibitors of all such bother by arranging that a flat rate should be charged the societies, such rate ruling according to the size of the society, from £3 per annum down to £1 per annum. The report notified that quite a number of societies had already availed themselves of this concession. Reference was also made to the good work which had been done on behalf of the societies with the Railway Department, the principal item being with regard to the continuance during the present year of the concession made to exhibitors of live stock at shows.

GOVERNOR'S ADDRESS.

His Excellency the Governor, who was received with applause, thanked the delegates for the kind invitation which had been extended to him to be present. He made explanation regarding remarks which he had made at Barcaldine on the subject of wool, explaining that at many of the centres he had visited he had noticed the absence of sheep, and had expressed regret that there were not more sheep shown. At the Barcaldine Show he had noted a fair display of sheep, and stated that they were the best he had seen at any show, not —as the report stated—that he had seen in Queensland. He trusted that his explanation would remove any feeling which might have been caused due to this incorrect report. He was very pleased to be present at the meeting, and was glad to find that six additional societies had come into the circle during the past year. It was most desirable that every society should join, for their interests were in common. One of the very grave problems was what classes of stock they considered the best for the country, and he congratulated the societies upon the good work which they were doing towards assisting the solving of this problem.

HORSE BREEDING.

Mr. Ernest Baynes gave a brief address on the subject of the improvement of horse breeding. He pointed out that it was a most important matter, and one to which they could not pay too much attention, for horses of the proper sort would undoubtedly prove to be one of the finest assets imaginable to the State. Last October the Federal Government had called a conference of representatives of agricultural societies, and there certain facts relating to the horse-breeding business had been disclosed. After the outbreak of the war the Federal authorities went into the question of ascertaining what horses were available for military purposes, and to their surprise found that only 2½ per cent. of the horses in Australia were fit for military purposes. When it was explained that the horses embraced in these figures included even those under four and over twelve years, and also brood mares and foals, it could easily be understood how fatal had been the system of horse-breeding in the past. It was imperative, if horse-breeding was to be

improved, that better stallions should be used. He urged that agricultural societies should make it a condition that all stock should be entered in stud books. Nothing would improve live stock more than stud-book registration. He hoped that breeders would take particular notice of the fine lot of military horses which were being paraded daily on the Show Grounds, so that they could ascertain the type required for military purposes.

A discussion followed the reading of this paper, the general tenor being in favour of the certification and taxation of stallions with a view to eliminating undesirable nondescripts which were too prevalent in our State. His Excellency's suggestion that a sub-committee should be appointed to give advice to those trying to find good stallions was received with unanimous approval, and it was decided that the suggestion should be considered by the executive, who would take the necessary steps to make it effective.

A motion was carried to the effect that the Government should be asked to introduce a Bill providing for the registration of stallions, also for a stallion tax, and, further, to prevent the importation of horses of undesirable type.

Inoculation for Tick Fever.

A motion was submitted by the Rockhampton Agricultural Society—

> "That the Chamber urge the Government to take immediate steps to secure more effective means for improving and perfecting the process of inoculation for tick fever, and to this end the services of a leading scientist with reliable assistance be secured."

Mr. R. S. Archer and Mr. Booker spoke on this subject, submitting very emphatic arguments in its favour. It was unanimously agreed to adopt the motion, and to urge that the Government, if possible, get the loan from South Africa of Dr. Tyler, who was stated to be the most eminent living authority known on the tick question.

Educational Papers.

It had been intended that papers should be read by Mr. Cuthbert Potts and Mr. F. W. De Little, the former on "Agricultural Education in connection with the future development of the State," and the latter on the subject of "Cotton Growing," but as the lateness of the hour prevented justice being done to the importance of both papers, it was decided to publish them in conjunction with the minutes, so that they could be read and discussed at next meeting of the executive.

Election of Officers.

The following officers were elected for the ensuing year:—

President—Mr. John Macdonald.
Vice-Presidents—Messrs. G. H. Pritchard and Ernest Baynes.
Hon. Treasurer—Mr. W. J. Affleck.
Hon. Secretary—Mr. J. Bain.
Hon. Auditor—Mr. C. J. Booker, M.L.A.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	2	6	Ayrshire Herd Book of Queensland
		2	3	Holstein-Friesian Herd Book of Australia
		3	13	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Frisian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Frisian Herd Book of Queensland
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking.. ..	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book
H. M. Hart	Glen Heath Stud, Yalangur	7	21	Ayrshire Herd Book of Queensland

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH JUNE TO 28TH JULY, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	14 Feb., 1917	912	3·8	40·63	
Lady Margaret	Ayrshire	14 Sept., 1916	683	4·8	38·65	
Queen Kate	,, ...	30 June, 1917	971	3·4	38·58	
College Bluebell	Jersey	28 June ,,	773	3·8	36·43	
Princess Kate	Ayrshire	28 June ,,	683	4·4	35·37	
Auntie's Lass	,, ...	5 July ,,	852	3·4	33·84	
Buttercup ...	Shorthorn... ...	2 June ,,	779	3·5	31·90	
Confidence...	Ayrshire	25 June ,,	780	3·4	30·99	
Miss Bell ...	Jersey	1 Aug., 1916	562	4·6	30·45	
Rosine ...	Ayrshire	21 June, 1917	729	3·5	29·85	
Lady Loch II.	,, ...	3 June ,,	715	3·5	29·28	
Miss Security	Jersey	27 Mar. ,,	647	3·8	28·81	
Hedges Madge	Holstein	22 Mar. ,,	610	3·9	27·91	
Iron Plate ...	Jersey	6 Dec., 1916	491	4·8	27·78	
Thornton Fairetta	,, ...	30 June, 1917	410	5·4	26·17	
Skylark ...	Ayrshire	24 May ,,	539	4·0	25·31	
Lerida II. ...	,, ...	2 June ,,	563	3·6	23·74	
Snowflake ...	Shorthorn... ...	17 May ,,	499	3·9	22·83	
Cocoatina ...	Jersey	6 Mar. ,,	451	4·3	22·82	
Glade ...	Shorthorn... ...	29 Mar. ,,	504	3·8	22·45	
Constancy ...	Ayrshire	27 Dec., 1916	435	4·3	22·00	
Lady Spec...	,, ...	17 Jan., 1917	463	4·6	21·74	
Miss Betty	Jersey	27 Mar. ,,	469	3·9	21·46	
Violette's Peer's Girl	,, ...	13 Dec., 1916	304	5·9	21·23	
Miss Edition	,, ...	25 Dec. ,,	393	4·4	20·35	
Lilia ...	Ayrshire	11 June, 1917	536	3·2	20·01	

TANNING RABBIT SKINS.

Boil some wattle bark until it is of a thick, pasty consistence. Add enough water to make it the shade of brown required. Place the skin in the tan liquid, with the fur side of one resting on the skin side of the next, in layers till all are covered. Leave them in the liquor for a fortnight or twenty-one days—the longer period for preference. Then take them out, and peg them on a board, as when first dried. Leave them till thoroughly dry, and they will be fit for whatever use you may put them to. The skins should be a good brown colour.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1917.

The total number of eggs laid during the month was 8,820. Westerly winds prevailed during the month, which resulted in the majority of the light breeds going off slightly. The heavy breeds did not waver, and some fine laying records were put up. Morris wins the monthly prize in the heavy breeds with the fine total of 173. In the light breeds, Miss Hinze wins with 146 eggs. R. Burns's bird in the single test laid 31 eggs for the month, bringing her total to 112 eggs in 122 days. Walters's pen of black Orpingtons laid 116 eggs up to the 20th, laying six per day for twelve days running; on the 21st, two of the hens went broody. Broodiness has occurred in all the heavy pens in the six-hen test, with the exception of those owned by Claussen, Manson, and Morris. In the single test, G. W. Holland's G. bird was the only case of broodiness. The eggs of all the competing pens have been weighed, but owing to there being such a big majority under 2 oz., and taking into consideration the bad weather that was experienced during the time the weighings were taken, it is deemed advisable to take a second weighing in more favourable weather. The health of all the birds has been excellent. The following are the individual records:—

Competitors.	Breed.	July.	Total.
	LIGHT BREEDS.		
E. Chester	White Leghorns ...	129	490
*G. H. Turner	Do.	128	431
W. Becker...	Do.	117	424
W. R. Crust	Do.	124	403
Oakland Poultry Farm	Do.	110	398
G. Chester	Do.	128	397
F. W. Leney	Do.	142	391
T. A. Pettigrove, Victoria	Do.	123	389
Chris. Porter	Do.	143	386
Moritz Bros., S.A.	Do.	136	379
*J. Zahl	Do.	111	377
*J. R. Wilson	Do.	116	369
T. Taylor	Do.	110	369
T. B. Hawkins	Do.	114	361
*A. W. Bailey	Do.	110	359
*J. M. Manson	Do.	143	356
J. G. Richter	Do.	129	353
Mars Poultry Farm	Do.	127	349
A. H. Padman, S.A.	Do.	75	345
*A. T. Coomber	Do.	114	341
Kelvin Poultry Farm	Do.	133	340
Quinn's Post Poultry Farm	Do.	139	337
C. Knoblauch	Do.	97	331

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
LIGHT BREEDS—*continued.*			
D. Fulton	White Leghorns ...	125	322
R. Holmes	Do.	110	320
A. Shillig	Do.	117	319
*Mrs. J. R. D. Munro	Do.	113	319
*Dixie Egg Plant	Do.	118	309
Miss M. Hinze	Do.	146	299
F. Clayton, N.S.W.	Do.	110	285
J. L. Newton	Do.	115	281
Geo. Williams	Do.	95	280
*C. C. Dennis	Do.	115	275
L. G. Innes	Do.	115	266
*T. Fanning	Do.	99	266
Mrs. W. D. Bradburne, N.S.W. ...	Do.	98	263
*A. E. Walters	Do.	123	256
J. Holmes	Do.	114	248
G. J. White	Do.	118	246
G. Howard	Do.	121	245
E. Cross	Do.	87	244
Mrs. J. Carruthers	Do.	111	240
Mrs. F. J. Sear	Do.	110	224
C. H. Singer	Do.	93	223
E. A. Smith	Do.	106	220
C. P. Buchanan	Do.	85	216
J. Ferguson	Do.	94	208
S. C. Chapman	Brown Leghorns... ...	86	206
*Dr. E. C. Jennings	White Leghorns ...	91	190
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	161	444
A. E. Walters	Do.	157	408
W. Smith	Do.	156	405
F. A. Claussen	Rhode Island Reds ...	142	387
*Mars Poultry Farm	Black Orpingtons ...	138	386
W. S. Hanson, N.S.W.	Do.	147	358
*E. F. Dennis	Do.	151	337
D. Kenway, N.S.W.	Do.	114	337
Cowan Bros., N.S.W.	Do.	133	333
P. C. McDonnell, N.S.W.	Do.	131	319
H. Jobling, N.S.W.	Do.	111	303
Mrs. J. H. Jobling, N.S.W.	Do.	143	279
King and Watson, N.S.W.	Do.	121	268
F. Clayton, N.S.W.	Rhode Island Reds ...	79	241
*Oakland Poultry Farm	Black Orpingtons ...	128	230
C. B. Bertelsmeier, S.A.	Do.	138	228
R. Burns	S. L. Wyandottes ...	141	224
E. Morris	Black Orpingtons ...	173	213
*E. A. Smith	Do.	152	208
C. C. Dennis	White Wyandottes ...	109	207
*Kelvin Poultry Farm	Plymouth Rocks ...	120	190
*Miss M. Hinze	Black Orpingtons ...	141	174
J. M. Manson	Do.	134	174
*F. W. Leney	Rhode Island Reds ...	78	158
Totals	...	8,820	22,235

* Indicates that the bird is engaged in the single hen test.

RESULTS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
G. H. Turner	53	67	86	79	67	79	431
J. Zahl	76	55	82	27	80	57	377
J. R. Wilson	67	60	58	64	68	52	369
A. W. Bailey	36	47	71	69	67	69	359
J. M. Manson	65	54	51	53	59	74	356
A. T. Coomber	67	9	72	69	52	72	341
Mrs. J. R. D. Munro	86	46	46	46	25	70	319
Dixie Egg Plant	50	62	64	70	62	0	308
C. C. Dennis	53	43	15	51	55	58	275
T. Fanning	14	55	56	52	33	56	266
A. E. Walters	28	38	35	54	60	41	256
Dr. E. C. Jennings	20	11	33	44	63	19	190
R. Burns	51	40	83	58	100	112	444
Mars Poultry Farm	62	79	54	75	59	57	386
E. F. Dennis	52	46	67	69	71	22	327
Oakland Poultry Farm	70	27	28	23	67	15	230
E. A. Smith	27	23	28	65	37	28	208
Kelvin Poultry Farm	43	22	19	70	13	23	190
Miss M. Hinze	33	25	28	34	33	21	174
F. W. Leney	23	24	0	20	69	22	158

THE POULTRY INDUSTRY IN QUEENSLAND.

The following informatory paper on this subject was read by Mr. J. Beard, Instructor in the Poultry Industry, Department of Agriculture and Stock, at the Poultry Conference, held at the Queensland Agricultural College, Gatton, on 21st August last:—

As no doubt you are aware, the poultry industry for a number of years past has been very much neglected, and has been allowed to run its own course. This can be accounted for to some extent owing to the want of attention to this branch of rural industries in the past.

It is to be regretted that Australia has not yet decided that it should be self-supporting in the matter of poultry. Unfortunately, into some of the States, Queensland included, both eggs and egg pulp were being imported. I hope, and I feel certain you will agree with me, that the importation of eggs and pulp from the East will be unknown in the immediate future.

I regard the poultry industry of Queensland, so far, as being in its infancy, although it is annually progressing. In America big things were being done, and what the industry was doing for itself in America should strike all Queenslanders. It really showed how very important the industry was.

People need have no fear of the venture, and should have no need to think they were entering on a venture that was not an important one. A great deal had been done in Australia, and already the value of the production annually was close on £2,000,000.

From the returns supplied from the various petty sessions districts, ranging from Rockhampton to the southern borders of the State, and also

including the districts of Herberton, Cairns, and Mackay, which forwarded their returns and are here included, the following figures will enable you to form some idea of the value of the returns of the poultry industry. Unfortunately, towns such as Rockhampton, Bundaberg, Maryborough, Gympie, Brisbane, Ipswich, Toowoomba, and Warwick are not included in these returns. Large towns in America, and the other States of the Commonwealth, are not included in these annual returns.

The decrease in poultry in 1915 from that of 1914 was by no less than 208,573, and eggs by more than 10,500,000; taking the average price of eggs in 1915 at 1s. 6d. per dozen, the loss was over £65,000.

Dugandan with 33,839 common fowls, or 35,779 all kinds, and total egg production 135,033 dozen, although much less than 1914, is again in the first place.

Brisbane follows with 29,030 head of poultry (all kinds), and 127,058 dozen eggs.

Maroochy returns 100,542 dozen eggs, third place with only 16,348 birds. Harrisville and Gatton run very close in number of all fowl, 98 in favour of Harrisville, which returned 35,623 dozen eggs in excess of Gatton.

Rockhampton returned 19,333 birds, and 86,550 dozen eggs.

Rosewood returned 17,753 birds and 85,431 dozen eggs, which is a better average.

For the year 1916, Dugandan again heads the list with 39,874 fowls, showing an increase of 4,094, although the increase in eggs only totalled 787 dozen.

Brisbane also holds the second place again with 33,810 fowls, showing an increase of 4,780, while her egg supply increased by 30,806 dozen.

Harrisville and Gatton run very close again as to the number of fowls, 59 being in favour of Harrisville as against 98 last year; the latter also shows a return of 112,414 dozen eggs, being an increase of 42,458 over that of last year. Gatton egg returns show 69,956 dozen, an increase of 12,320 dozen for the year.

The following table will enable you to form some idea of the industry as it stands at the present time. I will not give you an outline of the whole of the districts embraced in the returns, as it would take up too much time. I will leave that for the Press to publish.

The totals are as follows for the years 1914, 1915, 1916:—

Year.	Fowls.	Ducks.	Geese.	Turkeys.	Others.	Eggs.
						Dozens.
1914	906,772	41,070	7,785	28,334	2,487	3,429,908
1915	729,163	25,321	6,166	15,688	1,559	2,554,687
Decrease ..	177,609	15,749	1,619	12,666	903	875,221

Total decrease of fowls, all kinds, 208,573.

Although the prospects of the industry were brighter for the year 1916, and show an increase over that of 1915, the returns still show a large falling off from the 1914 returns. The totals are as follows:—

Year.	Fowls.	Ducks.	Geese.	Turkeys.	Others.	Eggs.
						Dozens.
1916	821,016	38,499	7,196	21,046	2,925	2,782,914
Increase ..	91,853	13,178	1,030	5,378	1,366	228,227

The total increase for the year 1916 over and above the year 1915 was 112,805 fowls of all kinds, still showing a shortage of 95,768 fowls and 646,994 dozen eggs. I trust the foregoing returns will impress upon your minds that there is need for greater improvement. This can be done by organising the poultry industry and encouraging production, and secure the Australian market for the Australian producer.

I would like to have a few words on turkey-raising. It seems to be an established fact that turkey-raising in this State is on the decline, where years ago a flock numbering 100 or 200 was a profitable adjunct on the country farms. Now these birds are found but rarely, and then in flocks of a dozen or less, tolerated rather than fostered. The cause is hardly apparent. The thickening settlements have not yet encroached upon the solitude of many a backlying farm where green paddocks and sheltering timbered country offer ready for use the best possible food and shelter. True, they may damage to some extent the growing crops, but they will render services much more valuable than what they destroy in the wholesale destruction of grasshoppers and insects which threaten the farmer on every hand, and which they incessantly pursue as the principal article of their diet.

I will not touch on turkeys any more than to give you some idea of the turkeys raised in this State. I find for the year ended 1914, 28,334 turkeys were accounted for, while for 1915 we only got returns for 15,668, showing a decrease of 12,666. Putting them on the low average of 8s. per head means a loss of £5,066 8s. to the producer. For the year 1916 we got a more favourable return of 21,046, or an increase of 5,378 over the preceding year.

For the year 1915, Warwick takes first place by supplying 1,029, with Dalby second 1,004, Nanango 790, Beaudesert 673, and Harrisville 615.

For the year 1916, Dalby is easily first with 1,905, showing a very satisfactory increase of 901 turkeys. Warwick with only 1,079, showing only an increase of 50, takes second place, Beaudesert 912, Nanango 866, and Pittsworth 810. I have given the five leading districts for each year.

We have an ideal country for the production of high-class and utility poultry. No other portion of the world is so favoured in this respect, but the industry is still in its infancy. We should not fear over-production, as the demand for both eggs and poultry of the right kind is incessant.

IN-BREEDING.

It is quite amusing to hear the opinions expressed by many poultrymen on this great subject. The man who thoroughly understands breeding knows for a certainty that he will never make any advance in his work unless he adopts the principle, and he succeeds where he realises the inherent dangers of the principle. For there are dangers, and it is failure to realise this fact that is responsible for the condemnation of the system among those who have not thoroughly studied it. While in-breeding is the most effective means we have at command of fixing type, it is also the most effective means of perpetuating defects. Thus, in-breeding with desirable prepotent animals enables us to gain, in the shortest possible time, the ideal we are aiming at; in-breeding with ordinary birds, weak perhaps in constitutional vigour, leads only to disappointment and degeneration. It is well, therefore, that those who are antagonistic to the principle should maintain their prejudice against it. In-breeding is not for them; it is better left to the man who may be regarded as a professional in his work, and who is guided not alone by egg performance but by signs of constitutional vigour and desirable type. The exceptional layer may be a freak, and not improbably leave disappointing stock, and the male birds from an exceptional layer may be a most undesirable bird for the breeding pen. We would warn poultry men against the extreme policy of introducing new blood; by this means retrogression is invited. It should be a simple matter where a good strain has been once obtained to bring back fresh blood from a reliable breeder of good female stock to whom a cockerel has been sold for breeding purposes. This use of half-blood is the simplest means we have at command of perpetuating desirable type. But even with this method the half-blood introduced should be a prepotent bird, typifying masculinity in the whole of his make-up.—"New Zealand Farmer."

TURKEYS AND THEIR MANAGEMENT.

By J. C. BEARD, Instructor in the Poultry Industry.

While I have not had as much experience in raising turkeys as a good many others, I have had continued experience with them for thirty-five years. Hence, my remarks will be from a practical standpoint.

Generally it is considered that one male will mate with six to twelve females. Some people have even only used one male to twenty-five hens. The latter plan is very unwise, and not worth the risk of using only one male with your entire flock.

For the following reasons:—A female usually allows the male to tread once. If, from any cause, the male did not effect proper connection, the eggs would not be fertile, and the best part of the season would be lost, because the first hatch is considered the best.

The hen, after connection, selects a place for her nest. This is usually done by scratching up the earth, so as to make a hollow place in which to keep the eggs from rolling out. A great deal of the risk of

males not fertilising the eggs could be avoided in the following way:—Use two males alternately every day, but under no consideration allow both males to run with the females at the same time. If you do this, you will, as a rule, have bad luck, as the males will fight and, at times, hurt themselves as well as the females.

The lack of fertility in eggs and vigour in young poults is one of the main reasons for the decline in turkey breeding in this State. I feel certain that the main cause is in-breeding. There are many turkey breeders who, in the past, have not thought it necessary to obtain new blood, and who thought they could save a few shillings by borrowing a male from a neighbour, in this way using the same blood year after year. This has been done for so many years that the vitality has been about bred out. The vitality has got so low that it creates disease, and I am sure that many of the turkey diseases with which we have to contend have been caused by lowering the vitality of the turkey. I believe there is no other variety of birds in which the vital forces decrease so rapidly by in-breeding as in the turkey.

I think it possible, under proper management, to raise turkeys in every part of the State, and I believe, if farmers in general would be more careful about in-breeding, and would see that they have the proper kind of males to breed from, such as will introduce new, strong, hardy blood into their stock, they will be able to raise turkeys as they did in years gone by.

A WORD TO PURCHASERS.

When you wish to buy, first select a reliable breeder, and if you want breeding birds, you can easily purchase them at a reasonable figure; but if you want show birds for breeders (which are the best), do not expect them at common breeding stock prices, for no man's whole flock is composed of show birds, even if many of his old breeding stock were once show birds. If the breeder tells you that his birds were never beaten in a show, immediately learn where the birds were exhibited, whether in a local show or in a show like the National. No person has made a clean sweep at many large shows unless the competition was very small indeed.

Having selected your breeding stock, the next thing is to know how to feed. To ensure good health, the breeding stock must be provided with a variety of grain, grit, and charcoal. As a conditioner and health preserver, charcoal has no equal for the turkey family. When turkeys have free access to charcoal, very few will become sick or ailing. Good, sound short oats will be found the best all-round grain for turkeys, especially during breeding season. A small amount of maize and wheat can also be fed to good advantage. Over-fat specimens are, as a rule,

very poor breeders. Turkeys require a considerable amount of water, and should always have a liberal supply kept in the shade, free from the sun's rays. Where the breeders have the free range of the farm, they

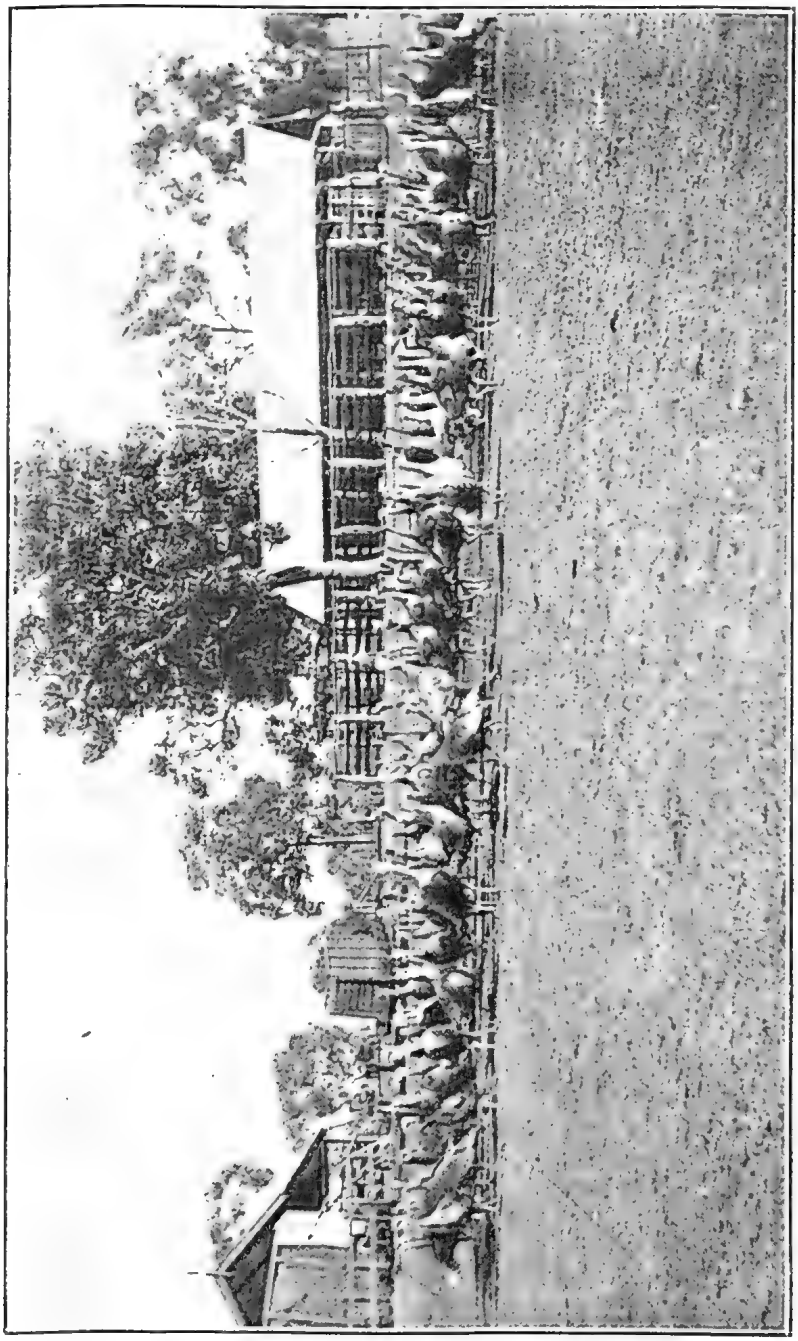

PLATE 19.—TURKEYS AT LARGE.

require very little grain food after they commence to lay. Many farmers hatch the first laying of turkey eggs under ordinary hens. While some make a success by this method, many more make a failure, as young

poults do not thrive with ordinary hens. For two principal reasons—namely, proper food and lice.

In their natural state, the young poults live almost entirely on insect food, which is not, and cannot be provided where brooded with the ordinary hen. Therefore, you would be feebly trying to make them thrive on food entirely foreign to nature. The better plan would be, when you have more eggs than the turkey hen can cover, to put all surplus eggs under ordinary hens at the same time as you set the turkey hen; and, as the eggs under the ordinary hen begin to chip, put them under the turkey hen, otherwise she may not take to them after their being hatched with the ordinary hen.

Having finished hatching, the time has arrived to try and rear your poults. These require no food for thirty-six hours after hatching. As a rule, many young turkeys are killed by over-feeding. On a farm where the hen turkey and her poults have plenty of range, it is best to feed them only twice each day, once in the morning and again at night. Young turkeys can live on insects and many small grasses which they relish. You will always find that food they get in the paddocks will keep them in better condition than anything you can give them. In seasons when there is a good supply of grasshoppers the turkey will live almost entirely on them.

When young turkeys have to be fed the best food I know of is stale bread, but be sure the bread is not sour. Moisten the bread with new milk that has been brought to three-parts boiling point, and allow it to cool before moistening the bread. This must be fed crumbly by pressing out the milk with your hand. This can be fed for three or four weeks. Then gradually get them to eat cracked wheat and maize. These grains should be scalded, as it will then assist digestion, but do not feed it until it has thoroughly cooled. Indigestion is very prevalent among turkeys, both young and full-grown. If the season is getting late and the warm weather sets in, discard maize in any form, as this is overheating and is the cause of many troubles in young turkeys.

Another splendid feed is hard-boiled eggs with onions chipped fine. To either feed some powdered charcoal should be added, which serves as a grit and prevents sourness of the crop, which is the cause of many deaths.

If your poults should have diarrhœa from any cause, one feed of boiled rice will usually stop the trouble. Another common, but sure, relief is to give them red pepper—say one tablespoonful. Mix it with about two tablespoonfuls of pollard. Then moisten it with water, but not wet enough to make it sticky. Cut it up into about four or six parts and in oblong shape, put them into an oven, and bake hard. It is well to have a few always in hand, as after baking, they will keep for a long time in a dry place.

If you have a turkey, either old or young, with a bad case of diarrhœa, give one pill three times a day until the droppings are improved. Then give a tablespoonful of castor oil, if the turkey is full grown, or a teaspoonful to a young poult. This treatment will often stop the worst cases of diarrhœa.

INDIGESTION.

As a rule a turkey grows very fast, and has an appetite like an ostrich, but without on ostrich's digestive ability, as the natural way for a turkey to eat is to pick up a grain here and there in such a manner as to give the digestive organs a grain at a time to digest, then the digestive mill grinds slowly, without being clogged. This method of feeding keeps up a steady circulation and the turkey keeps growing larger and stronger, the digestive organs being developed as the turkey grows, and they are therefore better able to do their work when more food is required to be digested to build up a large frame. On the other hand, when the poults are overfed the machinery is clogged, and there is a general smash up, the effect being similar to that caused by throwing a bushel of maize into a corn cracker. The machine will do its work all right if fed slowly, as will the digestive organs of a turkey. A turkey is a voracious eater, and will eat as often as you feed it.

There are other causes that will bring death with very nearly the same symptoms. One is lice, and another is lack of sharp grit and charcoal. A turkey cannot grind its food without grit any more than a miller can grind wheat without millstones. We might as well try to chew our food without teeth. In many cases, it is the absence of sharp grit that is the cause of them going off colour and eventually dying. If they get a little sharp grit in their food every morning, it keeps their grinding apparatus in perfect order. Very young birds do not find the grit of their own accord, and as they grow older they are liable to gorge themselves with the grit as soon as they discover it, thereby clogging their digestive organs, while a small quantity in their food each morning keeps them in excellent condition.

The only road to success with turkeys is to keep them healthy. Give them plenty of exercise, commencing by letting them run through the middle of the day at three or four days old. Keep the lice off, and with good clean water to drink, they will have very few diseases. But exercise they must have. On no account let them run in the grass until the dew is off, or in the grass on rainy days. This is one of the chief causes of white diarrhœa, a good remedy for which is new milk boiled, in which a little nutmeg is grated and stirred well while boiling. This to be given the poults to drink when cold. This is also a sure remedy for any kind of chickens.

TO PREVENT LICE.

Before setting the hen and placing the eggs in the nest, sprinkle tobacco dust in and around the nest, and again on the twenty-fifth day. By these means, you will quite, or almost, avoid any lice. But to make sure, it would be as well to rub a little pure lard on to each of the poult's heads. Dust both the mother and poults with some well-known brand of insect powder. If you think this too expensive, you could make up some yourself by obtaining 1 lb. flower of sulphur, 1 lb. of carbolic powder, and 2 lb. of fine white wood ashes, thoroughly mixed, and used from a duster made from any round tin with a few small holes perforated in the lid, as in a pepper box. Look carefully for the lice, for they are hard to find. Lice will kill a poult in a very short time.

TO ACHIEVE SUCCESS IN TURKEY RAISING.

Breed only from vigorous well-matured stock.

Keep stock in healthy condition.

Do not let poults run in wet grass.

Do not overfeed or starve young poults.

Make war on the lice.

Prevent disease by disinfection.

Use your best judgment and common sense.

Give plenty of range. The turkey is naturally a wild bird, and will not thrive in confinement.

Good grit, oyster shell, charcoal and fresh water should not be forgotten as an important part of their ration.

SPADE UP FEEDING PLACES.

In many places feed for the flock is scattered on the ground, and the chickens are continually fed within a small space, says a bulletin of the W.A. Department of Agriculture. The surface of the ground soon becomes foul with the droppings of the flock. True, the sunshine acts as a germicide, and if the space is at all sloping the washing of the rain helps to keep the surface clean, but generally the spot is level and often muddy. The ground quickly becomes contaminated with the continual tramping of the flock, and if there be one sick fowl the whole flock may soon become infected. This is especially true with small chicks and young turkeys. The first advice given in cases of general loss is "change your feeding place," but it is often impossible to find another location so convenient and accessible.

The poultry specialist of the University of Manitoba points out that the spading-up of the feeding place once or twice per week will bring good results. It will tend to purify the ground, and it will induce exercise on the part of the flock, which is always desirable. Especially is this true when the flock is confined in yards, and green feed, so necessary, is difficult to obtain. If grain is scattered, as one spades up the ground much will be buried so deep that hens will not scratch it out and it will be thrown up at the next spading with green, succulent blades that are greatly relished by the flock.

This method of spading up the feeding places is often worth trying, and the results in avoiding infectious diseases and improving the general health of the flock should be watched; with, of course, the reservation that the constant turning over of the same soil in a small run may eventually mean the working and reworking of heaps of droppings, which is not good.

The Horse.

MULE RAISING IN AUSTRALIA.

By E. BAYNES.

The usefulness of mules depends in a great measure upon the circumstance that they combine in a remarkable degree the constitutional attributes of their parents on both sides. Descended originally from the species of wild ass inhabiting the rocky semi-desert of Upper Egypt, where food is scarce and the heat intense, the jacks transmit to their hybrid progeny the faculty for resisting privation and withstanding tropical heat, which horses do not possess.

The value of mules cannot be overestimated. This has for a long time been realised in most parts of the world, although in England and Australia ignorance and prejudice have debarred their use on any big scale.

The testimony of those who have had experience of both horses and mules is convincing as to the superiority of the latter. They live longer and are able to withstand the effects of hard work for a greater number of years; they are constitutionally stronger, and less liable to sickness, to which horses are subject; they can be kept on coarser and cheaper food, and they are hardier and able to resist extremes of temperature, especially heat. Their narrow and small hoofs make them more sure-footed than horses, and they can pick their way over mountains and on the edge of precipices without much risk of disaster, and in positions such as these show more pluck and caution than horses.

These all-round advantages of mules over horses in the way of economy of keep outweigh the disadvantages with respect to certain uses. It is conceded at once that a mule is not as fast as a horse, and the heaviest draught mules are not as good as the heavy Clydesdales for actual pulling power; but an ordinary team of mules will beat the ordinary team of horses for pulling and for travelling great distances where food is scarce.

There are two distinct types of jacks in Europe. Those for getting heavy draught mules are bred in Poiton, in the West of France. The height of these is about 15 hands. In America, where hundreds of thousands of mules are bred each year, the Spanish or Catalonian jacks are the most popular. The Kentucky mules are famous all over America, and owe their fame to two Catalonian jacks imported to America in about 1830 or 1840 and crossed with the ordinary female donkeys of the State. They have produced a most useful strain of mule-breeding jacks. It is said that all the best mules in America owe their quality to the infusion

of those two jacks. So highly appreciated are mules in the West States that in 1890 150,000 mules were foaled. At the present time something like 200,000 are foaled annually.

Anyone who has visited America must be struck with the numbers used. One sees them doing heavy dock work and railway work in the country, ploughing and ordinary farm work, and they are invaluable in mining and pack work. They will carry over 200 lb. over rough, high country, if properly loaded.

It is generally considered that three mules can be kept on fodder that would only be sufficient for two horses. They are peculiar creatures, and it has been proved they will pull better if a mare is in the lead, for, having been foaled and brought up by mares, they have a great affection for horses and a corresponding dislike for asses. With regard to the question of the fertility of mules, it appears to be admitted on all hands that they are absolutely sterile when paired together. The objection that is taken to mules on the score of bad temper and obstinacy may be dismissed by the remark that, in the opinion of competent judges, these so-called vices are the outcome of mismanagement and cruelty to beasts of highly-nervous temperament, which require kindness and intelligence in handling.

In a letter, dated September, 1916, to a friend of mine, Colonel Peacocke, of the Remount Department of India, and an officer of the War Office, says: "The American mule has been a perfect revelation to many people—all of them as quiet as sheep, and the percentage of mules to horses in all veterinary hospitals, and the wastage of mules compared to horses, is very small. We have brought them in three classes: (1) a few heavy mules, 16-17 hands weighing from 1,300 lb. to 1,500 lb., for use of heavy guns in Egypt; (2) artillery draught mules 15·2, weighing about 1,100 lb., and (3) what we call carters, that which can go in draught in the limbered service waggons. I fancy when her soldiers go home they will, all of them, have nothing but praise for the American-bred mule. I wish Australia would go in for breeding mules."

Mr. J. S. Love, of Townsville, a gentleman who probably knows more about the remount question than most shippers—i.e., the type of horse required, &c.—has been importing many high class blood stallions to breed remounts on his own stations, and has lately gone in for mule breeding. We went to great trouble and expense in getting two really high-class Spanish jacks, and as these are doing duty in the far North, ideal country for mule breeding, I anticipate Mr. Love will make a success of it. I should think his lead worth following.

I have endeavoured to show some of the many good points of the mule, and I hope breeders in Queensland will go in for it. We have great areas of second-class land in the State, rough, stony ridges which are admirably adapted for mule breeding; but to those who are thinking of taking it up, let me caution them to be careful about the jack, the selection of the jack is of as much importance as that of a good sire in horse breeding. Never forget like begets like.

The Orchard.

THE "DUNNING" SEEDLESS ORANGE.

Notice having appeared in a previous issue of the "Agricultural Journal" respecting a new Navel orange named "Dunning's Seedless," specimens of this fruit have been obtained by the Director of Fruit Culture, Mr. A. H. Benson. Same have been photographed, and are reproduced herewith.

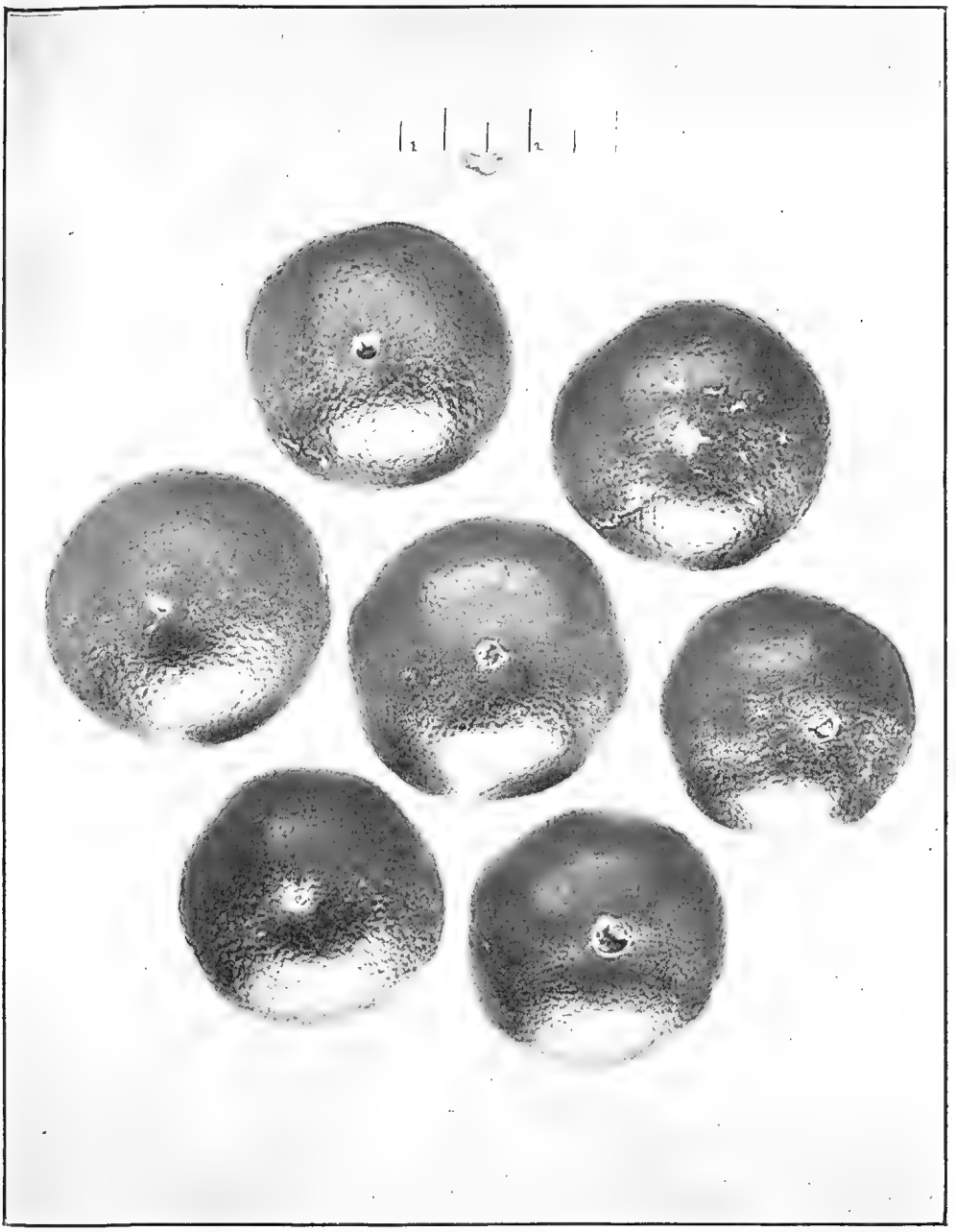

PLATE 20.—THE "DUNNING" NAVEL ORANGE.

Respecting this orange the Director states:—The fruit is of large size, averaging about 3¼ in. in diameter. In shape it is flatter than the average Washington Navel. The skin is of good colour and texture, and of moderate thickness, individual specimens possessing remarkably thin

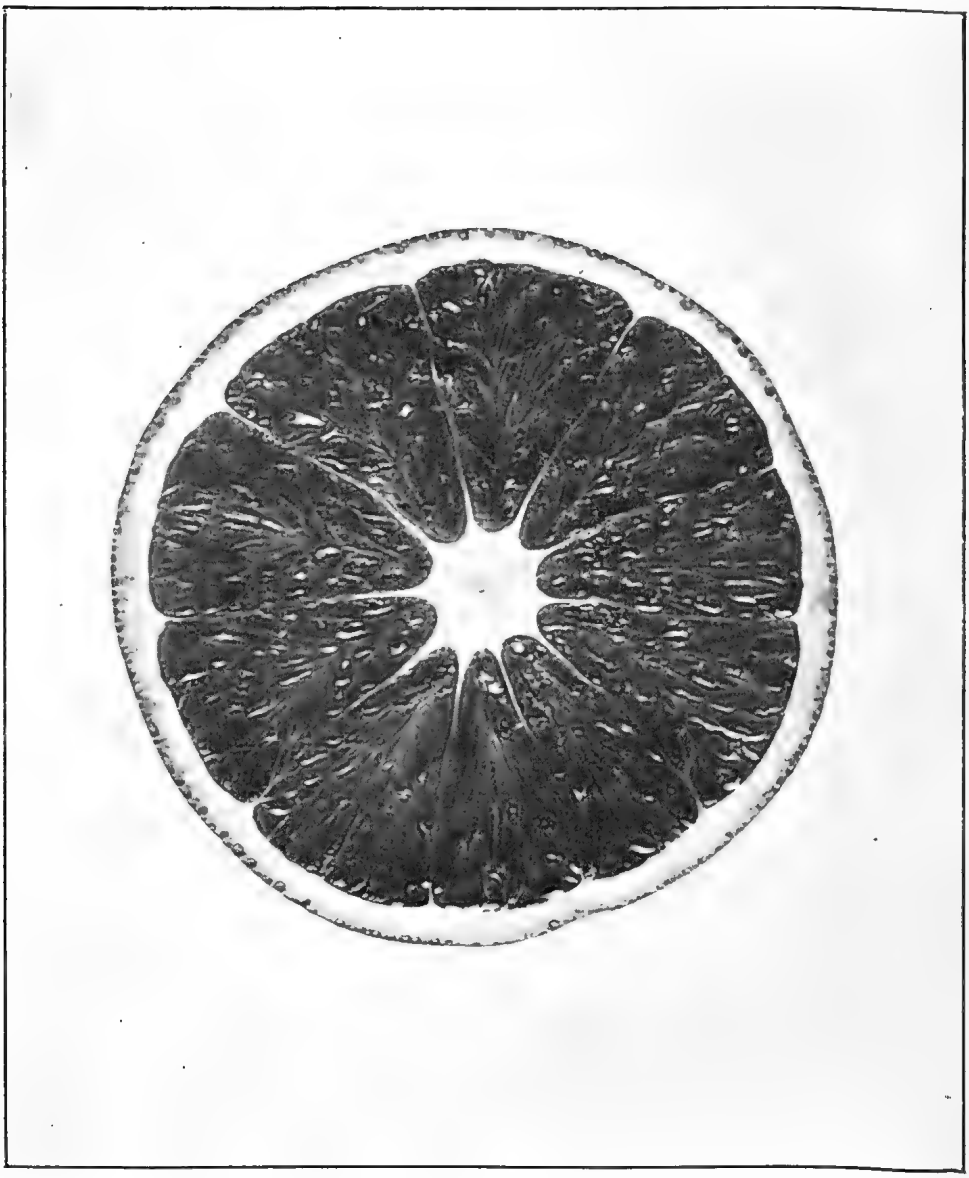

PLATE 21.—SECTION OF THE "DUNNING" SEEDLESS ORANGE.

skins. It differs from the Washington Navel in that the skin at the base is very much thinner as a rule than it is in this variety.

With respect to the Navel, this is usually very indistinct, and there is seldom any waste in the fruit which occurs when the Navel is large and distinct.

The flesh is firm, of good quality, and the flavour is excellent. The fruit is practically seedless, as it is only very occasionally that a seed is met with. The percentage of rag in the fruit is small.

With regard to the tree, the habit of growth is strong and vigorous, with large dark-green leaves. The tree is very thorny.

Owing to the fact that it is a Queensland-raised seedling, it is extremely likely that the good bearing qualities it has already developed will be maintained, and if this is so it will be undoubtedly a very much more profitable variety to grow than the Washington, which is frequently an uncertain cropper.

The Dunning's Navel has also one further advantage, and that is, owing to the inconspicuous navel, there is not the same chance of the fruit being attacked by the larvæ of the spotted peach moth, which frequently causes serious injury to the older sorts of Navels by boring into the fruit from the navel, which forms a natural protection for the egg of the moth and the newly hatched larvæ.

THE CASABAS AND THEIR CULTIVATION.

Referring to a fruit new to Queensland, which was introduced by Mr. Mobsby, of the Agricultural Department, on his return from the Panama Exposition, and who has since successfully raised the plant, Mr. B. Harrison, F.R.H.S., of Burringbar, New South Wales, writes in the local newspaper:—

"These magnificent fruits are as yet practically unknown here, where they could be grown as easily as melons or pumpkins. They are totally distinct from ordinary rock or water melons, and in a class by themselves. In California, U.S.A., where the climate is similar to ours, they are very profitable, and are grown extensively, and hundreds of car loads are forwarded to the Eastern States each season. There are many varieties, the best of which appears to be the Improved Hybrid, Golden Hybrid, Beauty, and White African; they all possess a most delicious flavour, and are more nutritious and sustaining on account of the firmer flesh than ordinary melons. They ripen up to quite late in the fall, and keep well into early winter, and if stored in a cool place will keep still later. Varieties placed in a sunny window for a few days will ripen well. In appearance most of them resemble a hard, heavy, wrinkled melon, and vary in weight from 10 lb. to 20 lb. The vines are robust and vigorous, and the foliage is larger than that of rock melons, and they are very

prolific. When the soil is not rich it should be well worked and manured, planting two to three seeds in each hill 12 ft. to 13 ft. apart. The soil should be kept loose round the plants until the vines begin to run, when they should be earthed up. When wanted for market, to which they carry well, the fruit should be taken from the vines when they lose their green lustre, but should not be eaten until about a week or so after they turn yellow, or give slightly under pressure as with a mellow apple. The flesh is firmer than that of ordinary rock melons, without any stringiness, and the flavour is splendid. Their cultivation should prove very lucrative to our farmers, who should readily obtain from 1s. to 3s. each for them, and they can be marketed right into the winter months, when other melons have disappeared."

Mr. Mobsby distributed some forty or fifty seeds from fruit produced in his own garden, and next season should see a considerable number of these melons on the market.

AN EASY WAY OF CURING LEAF CURL.

"A fruit farmer of many years' experience in Tasmania," says the "Tasmanian Fruitgrower" (7th July), "guarantees that a wire nail, if large enough, if not a piece of plain wire, driven through the trunk of a peach or plum tree will speedily cure the worst case of leaf curl."

"A CART HORSE WHICH WILL TROT."

A correspondent of the "Live Stock Journal," London, remarks:—"We have it now from Lord Derby that the type of horse most required for the Army is 'a cart horse which will trot,' and the sooner we begin to breed him the better. It is to be hopd that the Board of Agriculture will commence by offering some inducement to breeders to produce stallions of the type required, as, unless the sire is of the right type as well as the dam, we shall by further cross-breeding make it far harder in the future than it has been in the past to produce what we require." If Lord Derby's dictum be correct, why import the Percheron while we have in the Clydesdale a horse that can move a weight and trot with it?

It is interesting, in view of the experiment being made with the Percheron in England, to note that British artillery officers at the front are speaking in high terms of the Suffolk for artillery purposes. Lord Lonsdale, by the way, according to recent Home exchanges, has purchased three Suffolk mares to cross with his Percheron stallion!

Horticulture.

FOUR METHODS OF PROPAGATING GLOXINIAS.

The first, by seeds—When sown the seed should only be *very slightly* covered with very fine soil, and watering must be done with a fine rose can or, better still, with a garden syringe. The tin, pot or pan, should be covered with glass and shaded with paper. The glass requires to be turned over or wiped daily to remove the moisture that collects on the under surface. As soon as the seedlings can be handled they must be pricked off into other tins, or better, small pots—one to a pot. When established, a cool part of the veranda, but not a windy part, will provide a suitable position for them, and all that is necessary is to remove them to larger pots or tins as the growth of the plant demands. They should have received their last potting by Christmas.

After potting, the plants, which are inclined to be top-heavy, often refuse to stand upright, and there is a temptation to build the soil up higher to support them. This is fatal! Instead, take a few small pieces of stick and support the head of the plant by thrusting the sticks into the soil around the neck. Matches are ideal for this purpose.

A second is by dividing the old corms by cutting them so as to leave buds on each division (it is not advisable to split into more than two pieces).

A third method, by taking the young spring growths from old corms and striking them as cuttings. The latter method usually requires bottom heat, *i.e.*, heat beneath the cutting bed, produced either by decaying manure or hot water pipes, &c.

And lastly, but probably the most simple, is the leaf-cutting method. There are two ways of using the leaves. They may be inserted in the soil with a portion of the leaf stalk attached just as a cutting would be. A bulb will form at the base of the leaf stalk, and is then grown on in the usual way. Or a leaf with the mid-rib cut through at the back at a distance of about an inch apart may be pegged down flat on the soil surface and covered with glass as in the case of the seed. Numerous bulbs will form along the mid-rib where the cuts have been made and can be re-potted when the leaf decays.

These last two methods enable the grower to quickly work up a stock of any favourite colours or styles of flowers, but it must be noted that neither will be successful unless well matured leaves are used. Leaf cuttings enable one to work up a stock of these plants with little or no expense, for it is often possible to beg a leaf where one would have to buy a plant.

SOIL.

Mr. W. Stubbins, of Cape Town, South Africa, recommends—1 part good garden soil; 1 part leaf mould; ½ part old decayed cow manure (or 1 lb. Clay's fertiliser per bushel of soil); ½ part peat or chopped cocoanut fibre (rooted if possible); sharp sand to keep soil open.—"South African Gardening."

Tropical Industries.

SUGAR AND COTTON IN THE WEST INDIES.

THE RUSH TO PLANT SUGAR-CANE.

It will be admitted everywhere that the West Indies have experienced an extraordinary stroke of good fortune in that favourable seasons and high prices for sugar have prevailed for the last two years, since the beginning of the war. It is only to be expected that such conditions should render cane cultivation an attractive proposition and should tend to obscure the minds of those interested in this crop as to other aspects of the agricultural situation.

The increased interest that is being taken in sugar-cane is well reflected by the distribution of plants from the various Botanic Stations. It will perhaps serve a useful purpose to quote a few figures. In St. Vincent in 1913-14, the number of cuttings distributed was 8,500; in 1914-15, this jumped to 17,550; while in 1915-16 the high distribution was fairly well maintained at 14,900. In St. Lucia, during 1915-16, 3,000 cane cuttings were distributed to Crown land purchasers against nil the previous year. In Antigua, in 1915-16, the number of cuttings distributed was 254,617, which is about double the normal distribution. The case of Montserrat is even more striking. In 1913-14 there were 2,332 cane cuttings distributed; in 1914-15, 11,900; and in 1915-16, 17,676.*

The enticing aspects of sugar-cane cultivation have been shown to be responsible for considerable extensions of the area devoted to this crop. Some of this land was previously under cotton, and this fact brings up a point of special economic importance. It seems that owing to an unfavourable season there is likely to be a shortage of West Indian cotton next year. At the same time the demand for fine staple cotton in England is steadily growing stronger, owing to its employment for special purposes incident on the war. Consequently, abnormally high prices are likely to prevail. Under such conditions there may be more in cotton than in sugar, while from an Imperial point of view, West Indian cotton is obviously a most important product to produce since the mother country is dependent on these islands for its chief supply. Again cotton possesses an advantage over sugar in that it will stand indefinite storage, while the crop itself occupies the land for only half

*During the year 1916-1917, the Queensland Sugar Bureau distributed 1,000 tons of sugar-cane cuttings gratis to growers in this State.—ED. "Q.A.J."

the time required by sugar-cane, which allows of the cultivation of provision crops, fitting in well with the policy of more locally produced food.

The general line of argument, then, which it is sought to bring forward is the need for giving attention to the present agricultural position as a whole, and the danger that lies in allowing one's outlook to be obscured by the boom in sugar. Manifestly the position of the sugar-cane planter to-day is an extremely good one, but he should remember that there are four prime factors to his prosperity—market, season, labour, and ships. It is the last two which are of fundamental importance at the present time.

The revived interest which these figures and the previously mentioned facts convey is obviously the outcome of the favourable conditions of production recorded at the beginning of this article. The position of the grower is perfectly understandable: chances (of none too frequent occurrence) are in favour of big profits from cane cultivation, and the grower is seizing, and rightly seizing, his opportunity. But from a colonial point of view, from the point of view of the community, it is well to acknowledge the fact that the rush to plant sugar-cane is merely to fill a partial vacuum produced by the war, and it is well to remember that this, like conditions of climate, may change at any moment. The results might then be disastrous.—"Agricultural News," Barbados.

SOCIETIES, SHOW DATES, ETC.

Sandgate.—Brighton Farmers' and Fruit-growers' Progress Association. A. E. Streeter, secretary.

Malanda, No. 2.—The Eacham Pastoral, Agricultural, and Industrial Society. Duncan Brown, secretary. Show dates: 29th and 30th August, 1918.

Nerang.—South Queensland and Border Agricultural and Pastoral Association. H. A. Weedon, Secretary. Show Date, 5th October, 1917.

Jardine—Jardine Farmers', Dairymen's, and Fruitgrowers' Association. F. Maleozka, Secretary.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, Acting Government Botanist.

No. 11.

"DEVIL'S FIG" (SOLANUM LARGIFLORUM, *n.sp.*)*

Full Botanical Description.—A large scrambling shrub, the branchlets and foliage densely villous with stellate hairs. Prickles not very numerous on the branches, very rare on the petioles and under surface of the leaves, and none on the inflorescence. Leaves petiolate, rarely entire, usually irregularly sinuate, oblique at the base, thinly covered on the upper surface with a stellate pubescence, densely stellate-tomentose on the under surface and petioles, broadly ovate, acuminate, length 3-5½ in., breadth 2-3¾ in. Peduncles axillary once or twice forked, bearing numerous flowers on slender pedicels. Calyx thinly stellate-pubescent at the time of flowering 1½ lines long, with acuminate teeth on lobes somewhat enlarged in fruit and divided into ovate lanceolate lobes. Corolla white, deeply lobed, about ½ in. diam., lobes densely tomentose on the central portion outside. Fruit globular, glabrous, ½-¾ in. diam.

Habitat.—Kin Kin, *Francis and White.* (Type specimens.)

Notes on the Species.—We also have specimens of this *Solanum* in the Queensland Herbarium from Bundaberg and Childers, and it, no doubt, is to be found in other localities. It has always been placed previously as a southern form of *S. Dallachii,* and as such I left it until Mr. A. Francis, some few months back, drew my attention to it being a great pest in the Kin Kin district, and soon after that, a letter was received by the Home Department from the Noosa Shire Council asking for the botanical name of the plant, and that it be proclaimed a noxious weed. As the plant differs in some respects from *S. Dallachii* and does not seem to agree with any extra-Australian species, I have determined to name it as above. A more technical account is reserved for the next *Botany Bulletin.*

Acknowledgment.—My thanks are due to Professor A. J. Ewart, Government Botanist, Melbourne, for kindly comparing specimens of *S. largiflorum* sent him, with Mueller's type specimens of *S. Dallachii,* in the collections under his charge.

*As this paper describes a new species it is necessarily somewhat technical.

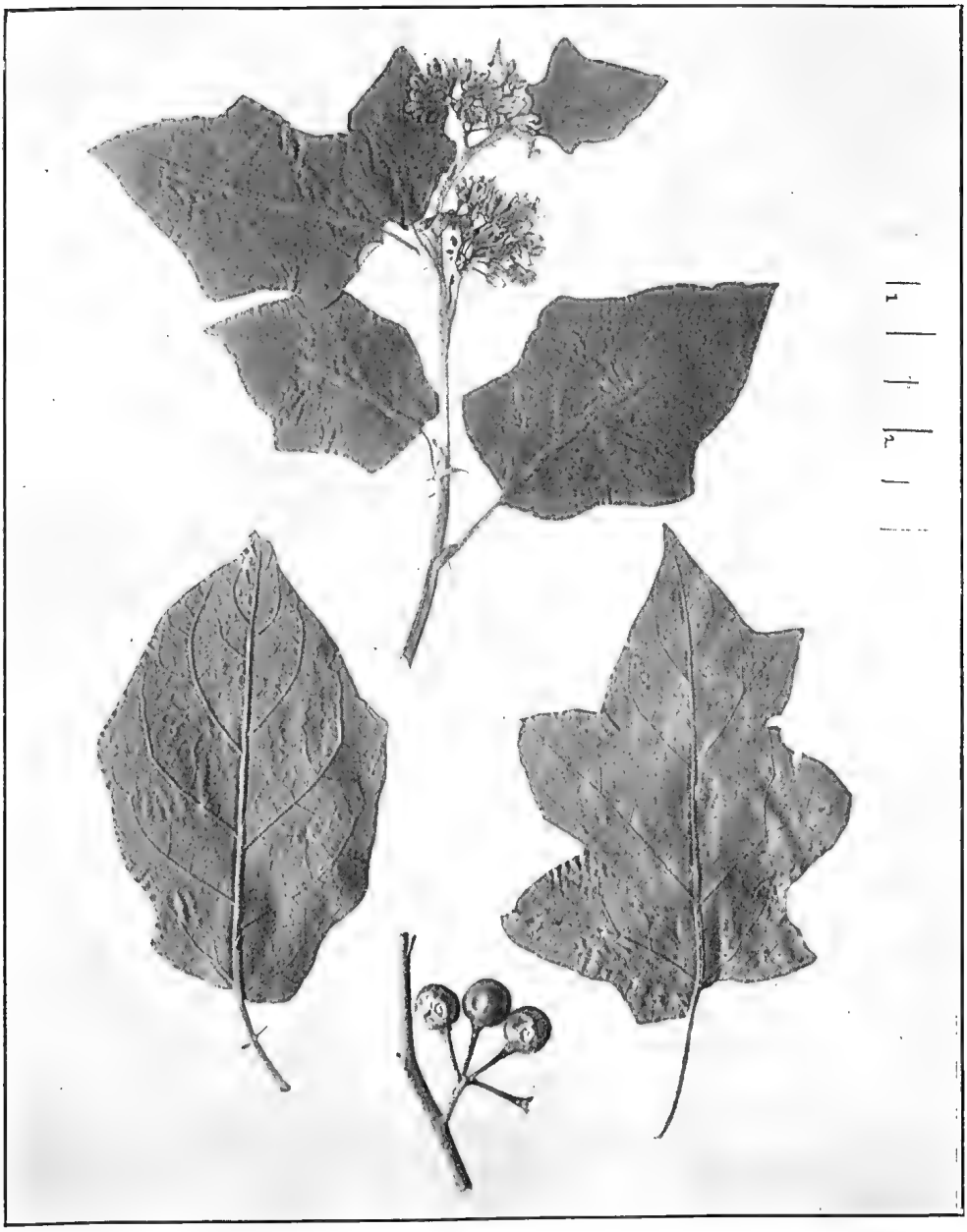

PLATE 22.—"DEVIL'S FIG" (SOLANUM LARGIFLORUM).

Botanical Name.—*Solanum* (derivation unknown) *largiflorum* (the specific name is given on account of it bearing numerous flowers. The flowers are not large in comparison with other species of the genus. In a genus of several hundred species such as Solanum, it is rather a difficult matter to choose suitable new specific names).

Local Names.—"Devil's Fig" is the common vernacular; it is also known as "Chinese Fig." This latter name is undesirable as the plant is a native, not an introduction; the name "Chinese Fig" does not necessarily point to the plant being an alien, as this adjective is often applied to undesirable plants: for instance, throughout Western Queensland *Bassia Birchii* or *Anisacantha Birchii* is universally known as "Chinese Burr," though the plant is endemic in Australia.

The aboriginal name "Koori" of the old Bundaberg natives given under *Solanum Dallachii* by F. M. Bailey ("Queensland Flora," p. 1087) belongs to this new species.

Eradication.—It is customary on our coastal "scrub" farms to allow such weeds as these Native Solanums (Wild Tobacco, Kangaroo Apple, Potato Bush, &c.) to run their course and die out; as the plant under notice, however, is about to be proclaimed a noxious weed more stringent measures will have to be taken in its control. Where the plants are few they may be grubbed out; cutting off close to the surface of the ground if carried out repeatedly should exhaust the vitality, but the treatment would have to be persistent to be successful; a little brine or a small amount of caustic soda and arsenic about the cut surface would prove useful. Spraying with arsenical solutions is not likely to prove of value and is out of the question where cattle are running, but an arsenical solution injected into the main root or branch should prove successful.

THE PRICE OF SEED COTTON FOR THE 1917-18 CROP.

For next season, in consequence of the increased price of cotton in the home and other markets abroad, the Department of Agriculture and Stock has decided to offer cotton-growers in Queensland 2d. per lb. for the next season's crop, under the same conditions as for this and the last crop. That is to say, that growers, instead of 1¾d. per lb., will receive an advance of 2d. per lb. on all cotton delivered at the State Ginnery, Brisbane, and at the close of the season's ginning, when the cotton is sold, will participate in all profits accruing after the expenses of ginning, baling, and marketing have been deducted. The effect of this advance in price will be that farmers will receive as much as, or possibly even more, for their cotton than they received in the palmy days of cotton-growing in Queensland during the American Civil War. Cotton seed, for September or October sowing, is supplied gratis by this Department.

Entomology.

THE SUGAR-CANE GRUB PEST.

The following "Notes on the Grub Pest" have been received from Dr. Illingworth by the General Superintendent of the Bureau of Sugar Experiment Stations. They are particularly interesting from the fact that they constitute Dr. Illingworth's first impressions, and secondly lay great stress on the benefit to be derived from cultural operations, especially the use of lime and green manure, the frequent use of which has been so long advocated by the Sugar Bureau:—

"Though we have been handicapped, to date, by a lack of transportation facilities, we have managed to get about somewhat, making observations with regard to the various factors determining the degree of grub-infestation, in the region about Gordonvale.

"The tremendous importance of the problem impresses one at once, upon viewing the great areas laid waste in districts like Meringa or Green Hills. Apparently there is no easy road to success in combating such a pest. Introduction of parasites would probably be of little avail, since we are here dealing with native insects. It is a well-understood fact that introduced parasites have only been used successfully against introduced pests. The fact of the matter is, we already find a number of parasitic and predaceous insects working against the grubs, but they are unable to show any marked results because they are themselves attacked by other parasites. There are, however, bacteria and parasitic fungi doing efficient work in some fields, especially under proper conditions of moisture, &c.; our excavations at Green Hills would indicate that approximately one-third of the grubs succumb to the attack of these organisms. We have not yet been able to determine how widely these friendly agents are distributed in the infested districts, but they certainly lend themselves to artificial propagation and transplanting, so that no field needs to be without them.

"In testing the soils of badly infested fields they were all found to be very poor in humus, and usually contained no lime—two factors which would appear to be of vital importance to the growth of sugar-cane in a grub district. First, the main food of the grubs is decomposing organic matter in the soil, which, if it is lacking, forces them to feed upon living roots of plants. Second, lime not only improves the character of the soil by hastening the humification of plant tissues, and making it possible for leguminous plants to store up a cheap and abundant supply of nitrogen, but its action is also very favourable to the development of the fungous parasites. It is a well-known fact that neither organisms of decay nor disease-forms will develop well in acid soils—*i.e.*, soils containing no lime.

"Apparently the general custom in all the grub-districts has been to destroy the principal humus-forming elements by burning all the trash, and failing to rotate cane with a green crop. So far we have only discovered one farmer who is working his land along the lines that science would suggest, and it is interesting to note that his farm, though originally rather poor land, is now among the best in the region about

Gordonvale; furthermore, he is not troubled with grubs, though the cane of near-by farms went down because of them. Moreover, this particular farm has better soil to-day than when it was opened up about twenty years ago. As to the treatment: The land was given a dressing of lime at the rate of about 1 ton per acre; a crop of beans was then turned under preparatory to planting cane. After two ratoons, and ploughing in all the trash, another crop of beans was worked into the soil, and in addition about 5 cwt. of meatworks manure per acre. This rotation has been followed up, with the result that our tests now show an abundant supply of humus. Recently, with the addition of about 2 cwt. of nitrate of soda per acre, this land has shown remarkable results. The crop is easily 50 per cent. better than that of an adjoining farm which was planted at the same time. I must not neglect to add that this farmer cultivates well, which is not only an important factor in plant development but may be shown to have considerable bearing upon grub control. This control would come about through the conservation of soil moisture, which would not only stimulate the growth of the cane, making it more resistant to the attacks of grubs, but the conserved moisture would also be of material assistance to the development of fungous organisms destructive to the grubs. These parasites cannot work in dry soil; hence, it is a well-recognised fact that grubs are more destructive in a dry season, or upon dry soils.

"The action of nitrate of soda or sulphate of ammonia is a marked stimulation of plant-growth and root-development, which makes the cane more resistant to the attack of grubs. Where there is a rapid renewing of roots as they are eaten off by grubs, the cane is able to hold its footing and does not go down before the winds. This point was well illustrated in one field that we visited—a part of which had been treated with about 2 cwt. of sulphate of ammonia per acre. The cane of part of the field was all down, while right to the line in the treated plot it stood erect and vigorous. The untreated portion could not be ratooned, because all the stools were too much out of the ground.

"As far as our observations have gone the indications are that high-lying fields are attacked worse than those on lower ground. This may be explained upon the grounds of weathering. Naturally, both humus and lime are leached out of high-lying soils, and tests show these soils to be very poor in both these elements.

"The use of arsenious poisons for the destruction of the grubs, as suggested by Mr. Jarvis, is very promising. Since we already know that they feed largely upon humus and decomposing soil substances, it would appear to be simply a matter of properly supplying and poisoning these organic bodies in the soil, preparatory to cane-planting. Fortunately, humus shows a marked affinity for arsenic, which has a defloculating action upon soil, making it more retentive to moisture. Chemical tests of certain soils of Hawaii, which have been treated with arsenic for the destruction of weeds for the past five years, show that all of the poison has remained in the top 4 inches of soil without injuring in any way the roots of the growing crop. If we can make use of arsenic as a weed-killer, and at the same time poison the food-supply of the grubs, it will certainly be a profitable procedure.

"Experiments are now being undertaken with 10 acres in one of the worst grub-areas on Meringa Farm, in order to test out the various suggestions as outlined above. This land is divided up into fifteen plots, from which we hope to get some conclusive results.

"It is rather early for us to make recommendations, but we should certainly say: 'Conserve the humus and apply lime'; later we may be able to suggest the best method of poisoning the grubs. In the meantime, make use of every known method of combating these terrible pests."

SUGAR-CANE PESTS.

The Bureau of Sugar Experiment Stations has received from Dr. Illingworth, the Entomologist at Gordonvale, the following report by the Assistant Entomologist, Mr. E. Jarvis:—

Work has recently been devoted principally to the study of the external anatomy and metamorphosis of certain of our more injurious cane beetles.

An illustrated treatise dealing with the habits and life-history of *Lepidiota frenchi Black* was prepared, and submitted to the Bureau of Sugar Stations.

I may state that the manuscript in question embodies an account of the egg and early larval instars—hitherto unknown to science—together with a technical description of the imago stage; while noteworthy specific structural differences between this insect and a closely related cane beetle (*Lepidiota*, No. 683) are also discussed and figured where necessary.

I wish to record the occurrence at Gordonvale last May of a new lepidopterous pest of minor importance affecting sugar-cane. The insect in question is a pretty hesperid butterfly named *Padraona hypometoma Lower*, a detailed description of which has been published by Lower (Revision of Australian Hesperidæ, Trans. Royal Soc. South Aust., Vol. XXXV., 1911), who records its previous occurrence at Herberton and Kuranda in March, and near Sydney in April.

At Gordonvale this butterfly was noticed eating the leaves of young cane plants growing in pots placed on a verandah at the laboratory. Although measuring scarcely an inch in expanse, its dark-brown wings contrasted with rich orange-yellow render it a fairly conspicuous insect, the latter colour being arranged in the form of an oblique stripe near outer margin of fore wing, and a large triangular blotch on costa of same, while a broad transverse band placed below two spots crosses the middle of the hind wing.

The pupa, which is about ⅝ of an inch long, is pale brownish-yellow with a dull red U-shaped plate on dorsal surface of anal segment, bearing two very short pointed horns, that part of its edge lying between them being scalloped, and the extremity of the anal segment flattened vertically and furnished with numerous yellow bristles.

This is the fourth species of Hesperidæ found attacking cane near Gordonvale, the other three—two of which occur also on sugar-cane in Java—being recorded in Bulletin No. 3 of this office (p. 22-25).

Since its publication, however, an additional butterfly (*Melanitis leda Lain.*) and a moth (*Mocis frugalis Fab.*) have been mentioned in monthly reports as occasionally destructive to the foliage of cane plants, so that our list of cane pests now includes sixteen lepidopterous insects.

General Notes.

NEW BOOKS.

We are in receipt of two books which should prove of much value to inexperienced, and even to experienced, men engaged in bush work, such as timber-getting and hauling, and in general forestry work. The contents of "A Hand Book for Rangers and Woodsmen" should be especially useful to Crown Land Rangers in this State, allowing for certain modifications in the matter of camp equipment, such as clothing, saddlery, provisions, &c., the details of which are more applicable to travel and camping out in the climate of North America than to the genial sub-tropical climate of Australia. Construction work is admirably dealt with, and the notes on this subject, especially in the matter of fencing of various descriptions, are of great interest to our bush workers. Other subjects ably dealt with are "The Care of Horses," "Identification of Live Stock," "Rope Fastening and Knots." There is a vast amount of valuable information in this book of 420 pages. Explanations of the various subjects treated are clear and intelligible, and the book is rendered of further value by the profuse illustrations. It is the work of a practical American forester, Mr. Jay L. B. Taylor, Forest Ranger, United States Forest Service. The book is well worth the price, 11s. 6d. The publishers are Messrs. Chapman and Hall, Limited, London.

The second book is said by the author, J. Arden Ferguson, A.M., M.F., Professor of Forestry at the Pennsylvania State College, U.S.A., to be an outgrowth of lectures given to agricultural students on "Farm Forestry" throughout several years, and is written for study by students of Agricultural Colleges and in High Schools. The denudation of our forests of hard and soft woods in Queensland, which has been going on for the past sixty years, without any attempt in the past to keep up the supply of our most valuable timbers, such as red cedar, beech, pine, silky oak, &c., as well as our splendid hardwods of the eucalyptus family, gives rise to the serious question of how to replace these timbers. The Forestry Department of the State is to-day fully alive to the necessity for forest reserves and for supplying, by tree-planting, the yearly deficiency. As Mr. Ferguson says, "Farm Forestry is a branch of the general subject of forestry, and aims to grow a crop of forest trees where it is impossible to utilise the land for other and more valuable purposes; thus forestry and agriculture go hand in hand in the use of all the land on the farm. The book deals with the natural methods of starting and reproducing a woodlot; with caring for the growing trees, protection and management; harvesting the products, contents of logs and trees; estimating the trees in the woodlot for board feet and cordwood, the use of perishable woods for fence posts, and how to treat them; and concludes with a suggested

list of practicum exercises that could be given in connection with a course in farm forestry. From beginning to end the book is highly interesting, and, if applied to forestry in Queensland, should be instrumental in inducing many farmers, part of whose land is unsuitable for general crops, to plant various trees which would be a valuable legacy to posterity. The price of this valuable addition to the literature of forestry is only 6s. The publishers are Messrs. Chapman and Hall, Covent Garden, London.

Department of Agriculture and Stock,
Brisbane, 20th July, 1917.

BURSARIES, QUEENSLAND AGRICULTURAL COLLEGE.

An examination will be held on the 18th and 19th December next in Brisbane and elsewhere, as may be decided upon, according to the localities where the candidates reside, for four bursaries at the Queensland Agricultural College. These entitle the holders to free board and instruction as resident students, and are tenable during good behaviour and the pleasure of Parliament for a period of three years. Candidates must not be less than sixteen or more than eighteen years of age on the 1st January, 1918.

Application for examination must reach the Under Secretary for Agriculture and Stock, Brisbane, not later than the 17th November next, and must be accompanied by (1) a certificate of birth; (2) proof that the applicant has resided for two years in Queensland, or that his parents have resided there for three years preceding the examination—this certificate to be attested by a magistrate; (3) a medical certificate that he is of sound constitution and in good health.

Past or present students at the Queensland Agricultural College will not be allowed to compete at this examination.

The examination will include English, mathematics, and nature knowledge, all on the standard and as outlined in the syllabus of the fifth class of the Queensland State schools.

In the event of two candidates receiving the same number of marks, the number of marks allotted to the examination in the elements of agriculture shall determine which candidate shall have the precedence, unless the Minister decides otherwise.

Unless the winner of a bursary takes up his residence at the college within one week after the commencement of the college year, he shall forfeit his right to a bursary. Except during the recognised vacations, the three years' residence at the college shall in every case be continuous, unless leave of absence for a specified period is granted by the Minister.

Further particulars on application to the Under Secretary.

WM. LENNON, Secretary for Agriculture and Stock.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1917.

Article.		AUGUST. Prices.
Bacon	lb.	9d. to 1s.
Barley	bush.	2s. to 2s. 6d.
Bran	ton	£5 15s.
Broom Millet	„	£20 to £22
Butter	cwt.	158s. 8d.
Chaff, Mixed	ton	£4 10s.
Chaff, Oaten	„	£7
Chaff, Lucerne	„	£4 to £7
Chaff, Wheaten	„	£3 15s. to £4 15s.
Cheese	lb.	9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	...
Hay, Lucerne	„	£3 10s. to £5
Honey	lb.	...
Maize	bush.	3s. 2d. to 3s. 3d.
Oats	„	2s. 10d. to 3s. 9d.
Onions	ton	£17 to £18
Peanuts	lb.	3d. to 4d.
Pollard	ton	£6 10s.
Potatoes	„	£8 to £11
Potatoes (Sweet)	cwt.	2s. 6d.
Pumpkins (Cattle)	ton	£2
Eggs	doz.	8d. to 9d.
Fowls	per pair	3s. 3d. to 7s. 9d.
Ducks, English	„	3s. to 4s.
Ducks, Muscovy	„	4s. 9d. to 8s. 3d.
Geese	„	8s. to 9s.
Turkeys (Hens)	„	9s. to 9s. 6d.
Turkeys (Gobblers)	„	15s. to 18s. 6d.
Wheat	bush.	3s. 6d. to 4s.
Hares	each	3s.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	2s. 6d. to 5s. 6d.
Cauliflowers, per dozen	8s. to 11s.
Celery, per bundle	..
Beans, per sugar bag	6s. to 10s.
Peas, per sugar bag	6s. to 13s. 3d.
Carrots, per dozen bunches	1s. to 1s. 6d.
Chocos, per quarter-case	2s. to 3s.
Beetroot, per dozen bunches	8d. to 9d.
Lettuce, per dozen	1s. to 2s.
Marrows, per sack	...
Parsnips, per bundle	7d. to 10d.
Rhubarb, per dozen bundles	...
Sweet Potatoes, per sugar bag	2s. 6d.
Table Pumpkins, per ton	£2 5s.
Tomatoes, per quarter-case	2s. 6d. to 8s. 3d.

SOUTHERN FRUIT MARKETS.

Article.	AUGUST. Prices.
Bananas (Queensland), per case	9s. to 14s.
Bananas (Tweed River), per case	...
Bananas (Fiji), per case	4s. 6d. to 6s.
Bananas (G.M.), per bunch	5s. 6d. to 7s.
Bananas (G.M.), per case	...
Custard Apples, per twelve to fifteen tray	...
Guavas, per case	2s. to 4s.
Lemons (Local), per bushel-case	2s. 6d. to 3s. 6d.
Mandarins, per case	4s. to 5s.
Oranges (Navel), per case	6s. to 14s.
Oranges (other), per case	4s. to 5s.
Papaw Apples, per half-bushel-case	1s. 6d. to 2s.
Passion Fruit, per half-case	4s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	8s. to 13s.
Pineapples (Ripleys), per double-case	7s. to 9s.
Pineapples (Common), per double-case	6s. to 7s.
Tomatoes, half-bushel-case	6s. to 10s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	AUGUST. Prices.
Apples, Eating, per bushel case	15s. to 16s. 6d.
Apples, Cooking, per bushel case	10s. to 15s.
Bananas (Cavendish), per dozen	1d. to 3½d.
Bananas (Sugar), per dozen	2½d. to 3d.
Cape Gooseberries, per quarter-case	6s. to 7s. 6d.
Citrons, per hundredweight	...
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	...
Custard Apples, per quarter-case	...
Granadillas, per quarter-case	...
Lemons (Lisbon), per quarter-case	5s. to 6s.
Limes, per quarter-case	...
Mandarins, per quarter-case	7s. to 12s.
Oranges (Navel), per quarter-case	9s. to 11s.
Oranges (Seville), per hundredweight	10s.
Oranges (other), per case	1s. 6d. to 3s.
Papaw Apples, per quarter-case	1s. to 2s. 9d.
Passion Fruit, per quarter-case	5s. to 8s. 3d.
Pears, per quarter-case	8s. to 12s.
Peanuts, per lb.	3d. to 4d.
Persimmons, per quarter-case	...
Pineapples (Ripleys), per dozen	10d. to 2s.
Pineapples (Rough), per dozen	9d. to 2s.
Pineapples (Smooth), per dozen	1s. to 2s. 3d.
Pomeloes, per hundredweight	...
Quinces, per quarter-case	...
Rosellas, per sugar bag	...
Strawberries, per dozen boxes	5s. to 17s. 6d.
Tomatoes, per quarter-case	2s. to 7s.

TOP PRICES, ENOGGERA YARDS, JULY, 1917.

Animal.	JULY. Prices.
Bullocks	£22 to £23 15s.
Cows	£16 5s. to £18
Merino Wethers	40s.
Crossbred Wethers	47s. 3d.
Merino Ewes	30s. 3d.
Crossbred Ewes	47s.
Lambs	37s. 6d.
Pigs (Porkers)	...

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, 1917, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1917.	July, 1916.		July.	No. of Years' Records.	July, 1917.	July, 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·82	15	0·30	2·68					
Cairns	1·52	34	Nil	2·93	Nambour	2·75	20	0·36	3·41
Cardwell	1·43	44	0·49	2·96	Nanango	1·75	34	0 52	3·62
Cooktown	0·96	40	0·09	2·07	Rockhampton ...	1·47	29	0·41	2·68
Herberton	0·55	29	0·22	3·03	Woodford	2·67	29	0·27	2·69
Ingham	1·45	24	0·09	6·48					
Innisfail	4·66	35	0·54	8·42					
Mossman	1·18	5	0 02	2·60	*Darling Downs.*				
Townsville	0·50	45	Nil	3·37					
					Dalby	1·84	46	0·67	2·50
					Emu Vale	1·46	20	0·74	1·88
Central Coast.					Jimbour	1·78	28	0·60	2·14
					Miles	1·81	31	0·81	3·43
Ayr	0·47	29	Nil	3·84	Stanthorpe ...	1·97	43	1·57	2·40
Bowen	0 93	45	Nil	2·70	Toowoomba ...	2·05	44	0·47	2·29
Charters Towers ...	0·56	31	Nil	1·24	Warwick	1·84	29	0·77	1·97
Mackay	1·59	45	Nil	5·22					
Proserpine	0·88	13	Nil	4·20					
St. Lawrence ...	1·25	45	Nil	3·09	*Maranoa.*				
					Roma	1·43	42	0·23	2·56
South Coast.									
					State Farms, &c.				
Biggenden	1·27	17	0·65	3·26					
Bundaberg	2·04	33	0 22	2·15					
Brisbane	2·28	66	0·55	2·00	Bungeworgorai ...	1·02	5	0·14	2·75
Childers	1·72	21	0·23	3·10	Gatton College ...	1·42	17	0·40	1·57
Crohamhurst ...	2·92	25	3·23	0·57	Gindie	1·01	17	0·37	4·44
Esk	2·03	29	0·63	2·12	Hermitage ...	1·50	10	0·92	2·05
Gayndah	1·51	45	0·73	3·14	Kairi	0·99	4	*	2·51
Gympie	2·17	46	1·14	3·46	Kamerunga ...	1·35	26	0·02	3·64
Glasshouse M'tains	2·49	8	0·22	3·60	Sugar Experiment				
Kilkivan	1·75	37	0·85	3·19	Station, Mackay	1·23	19	Nil	5·08
Maryborough ...	2·01	45	0·53	2 79	Warren	0·95	4	0·70	2·99

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

* Return not received.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·2	5·34	5·29	5·47	4·59	6·5	4·46	6·28
2	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·0	5·35	5·27	5·48	4·58	6·7	4·46	6·29
4	5·59	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·58	5·36	5·25	5·49	4·57	6·8	4·46	6·31
6	5·57	5·36	5·24	5·50	4·56	6 9	4·46	6·32
7	5·55	5·36	5·23	5·50	4·55	6·9	4·46	6·32
8	5·54	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·53	5·37	5·20	5·51	4·54	6·11	4·47	6 33
10	5·52	5·38	5·19	5·52	4·53	6·11	4·47	6·34
11	5·51	5·38	5·18	5·52	4·52	6·12	4·47	6 34
12	5·50	5·39	5·17	5·53	4·52	6·13	4·47	6·35
13	5·49	5·39	5·16	5·53	4·51	6·14	4·47	6·35
14	5·48	5·40	5·15	5·54	4·51	6·15	4·48	6·36
15	5·47	5·40	5.14	5·54	4·50	6·16	4·48	6·36
16	5·45	5·41	5·13	5·55	4·50	6·17	4·48	6·37
17	5·44	5·41	5·12	5·55	4·49	6·18	4·48	6·38
18	5·43	5·42	5·11	5·56	4·49	6·19	4·49	6·39
19	5·42	5·42	5·10	5·56	4·48	6·19	4·49	6·40
20	5·41	5·42	5.9	5·57	4·48	6·20	4·50	6·40
21	5·40	5·43	5·8	5·57	4·47	6·21	4·50	6·41
22	5·39	5·43	5·7	5·58	4·47	6·22	4·51	6·42
23	5·37	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·36	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·35	5·45	5·4	6·0	4·47	6·24	4·52	6·43
26	5·34	5·45	5·3	6·0	4·46	6·24	4·53	6·43
27	5·33	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·32	5·46	5·2	6·1	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·2	4·46	6·26	4·55	6·44
30	5·30	5·47	5·0	6·3	4·46	6·27	4·56	6·45
31	...	...	5·0	6·4	4·46	...	4·57	6·45

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

		H.	M.	
1 Sept.	○ Full Moon	10	28	p.m.
8 „	☽ Last Quarter	5	5	„
16 „	● New Moon	8	28	„
24 „	☾ First Quarter	3	41	„

The Moon will be at its greatest distance from the earth at midnight on the 14th, and at its least distance on the night of the 30th.

1 Oct.	○ Full Moon	6	31	a.m.
8 „	☽ Last Quarter	6	14	p.m.
16 „	● New Moon	12	41	„
24 „	☾ First Quarter	12	38	a.m.
30 „	○ Full Moon	4	19	p.m.

The moon will be furthest from the earth on the 12th, and nearest to it on the 28th.

7 Nov.	☽ Last Quarter	3	4	a.m.
15 „	● New Moon	4	28	„
22 „	☾ First Quarter	8	29	„
29 „	○ Full Moon	4	41	„

The Moon will be furthest from the earth on the 9th, and nearest to it on the 24th.

7 Dec.	☽ Last Quarter	12	14	a.m.
14 „	● New Moon	7	17	p.m.
21 „	☾ First Quarter	4	7	„
28 „	○ Full Moon	7	52	„

The Moon will cause an *Annular Eclipse* of the *Sun* on December 14th, but it will not be visible in Queensland. On the 28th there will be a *Total Eclipse* of the *Moon* between 7.38 and 7.55 p.m. It will be partly eclipsed for an hour and a-half before and after totality.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November, may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

THE TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana

and pineapple plants may be set out, and the orchards should be kept well tilled so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

THE SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant

sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. The planting of the sisal agave and the fourcroya may be proceeded with at any time of the year, but the best time is in spring and beginning of summer, when warm weather and good showers will enable the young plants to root quickly and become firmly established before the winter. The demand for the fibre is constantly increasing, and the supply does not nearly overtake the demand; hence prices keep high, and the outlook for the future is very promising. Plant only on dry or well-drained soil. Cotton may still be sown.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs, such as tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

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Agriculture.

COTTON CULTIVATION IN QUEENSLAND.

BY A. J. BOYD.

The following notes on cotton-growing in this State are based on actual experience of many years during which the industry has been carried on more or less vigorously both inland and on the coast lands of the State, which is favourably situated in the latitudes especially suited for the successful raising of cotton crops south of the Equator. The great cotton-growing districts of the world all lie within a certain zone, beyond which cotton cultivation has not proved profitable. This belt is comprised between latitudes 36 degrees north and 36 degrees south of the Equator. Queensland lies entirely within the southern limits, and is therefore eminently designed by Nature for cotton-growing. It will easily be understood that even in this favourable zone there are large areas unsuitable for cotton-growing—such as high tablelands, pure sandy tracts, swamp lands, or localities subject to sudden variations of temperature. Cotton loves a warm temperature; and where this is found combined with a moderate rainfall, there the plant will reach the greatest perfection. The Uplands cottons can also withstand long spells of dry weather; but the Sea Island variety demands a moisture in the atmosphere, which it only finds in the tropical portions of the State—say, northward from Mackay. Such are the climatic conditions to be sought by the cotton-planter.

CHOICE OF SOIL.

This is the most important matter to the cotton-grower. Whilst the plant will *grow* on almost any soil, it does not follow that it will be *productive* on each. The soil on which cotton thrives best need not be of the richest description, but neither may it be deficient in the special food needed by this crop. Some of our richest maize and sugar soils have yielded very indifferent cotton crops, while poorer soils, under exactly the same climatic conditions, gave handsome returns. In choosing a soil, therefore, for cotton-growing, a deep sandy loam, not too rich in humus, should be preferred to a heavy rich black soil. Heavy clay soils should be avoided, as they are more difficult and expensive to work. Stagnant water is one of the worst enemies to the cotton plant. What is required to ensure a good crop is a free soil, with good drainage, enabling the plants to obtain all the moisture they need whilst, at the same time, the superfluous water drains away. The cotton plant sends a long tap root into the ground, and it is this which enables it to thrive in continued dry weather. The preparation of the soil for a crop consists in ploughing and cross-ploughing as deeply as possible. Deep ploughing increases the water-holding capacity of the soil, and it also helps to mix the soil by quickly softening the more friable portions and allowing them to percolate into the cracks made by the ploughing process. It also permits the wind, water, air, sunlight, earthworms, bacteria, and other plant, animal, and mineral agencies to better perform their work of soil-building.

SOWING THE SEED.

In the old days of cotton-growing in Queensland, cotton was often sown in rows 6 ft. apart, with the plants 3 to 4 ft. apart in the rows. Such distances are now deemed excessive, except in the case of the Wide-spreading Sea Island varieties, or the Caravonica, grown at Cairns, which is planted in rows 7½ ft. apart and almost the same distance between the plants in the rows. Then, and up to the present day, the Upland cotton, both in the Southern and Central districts of the State, was considered to succeed best in rows from 3 ft. to 4 ft. apart, the plants being from 18 in. to 2 ft. apart in the rows in light soils, and 4 ft. by 2 ft. on richer land.

SPACING OF COTTON TO GET THE BIGGEST YIELD.

For years there has been a difference of opinion amongst cotton-growers all over the world on the spacing of cotton to obtain the greatest yield. The experience of to-day is that, generally, cotton gives the greatest yield when planted in close spacing. Exhaustive experiments to decide this question of spacing were made of late (1916) at three Mississippi Experiment Stations in the United States of America. The results showed that on land of moderate fertility, 3½-ft. rows with the plants spaced 12 in. apart in the drills, the yield was 1,632 lb. of seed cotton per acre. At 16 in. in the drills and 4 ft. between the rows, the highest yield was 1,274 lb. of seed cotton per acre.

The conclusion is that with the earlier dwarf varieties of Upland cotton, close spacing gives the highest yields.

THE NEW SYSTEM OF COTTON CULTIVATION.

The system here described and recommended, has been tested in the United States both by the Department of Agriculture and by practical farmers. It is this:—To secure an early short-season crop of cotton, thin the plants later and leave them closer together in the rows than is now customary. Keeping the plants closer together during the early stages of growth restricts the formation of vegetative branches, and induces an earlier development of fruiting branches. So long as the plants are close together, they do not form these vegetative branches; hence, by thinning them when the stalks have grown beyond the stage where these useless vegetative branches are produced, the latter are almost entirely suppressed.

This makes it possible to leave more plants in the rows than is now customary, and yet avoid injurious crowding.

THE BEST TIME TO SOW

in the South is from the latter end of August to October, November is rather late; but full crops have been gathered from November sowings, principally in districts where frosts only occur late in June or July.

PICKING.

Picking will begin for early-sown cotton about January or February, and for November sowing about March or April; and will continue until the frosts of July and August cut down the plant.

There are still people who hold the belief that black labour is required for getting off the crop. No such labour is needed, nor has it ever been employed, except in the very early days of the pioneer companies in the Southern portion of Queensland, where almost all the cotton exported was then produced. From first to last, cotton is a white man's crop. As soon as the bolls begin to open, they should be allowed to fully expose the cotton, which should be full and dry before being picked; and then the work should be taken in hand at once; otherwise the cotton will become somewhat discoloured by exposure to sun, rain, and dew. Cotton-picking is a far less laborious work than picking strawberries or Cape gooseberries. If the plants have been properly grown, the picker has scarcely got to stoop. With a full crop, young boys or girls of from fourteen to fifteen years of age can easily pick 100 lb. of cotton a day, and experienced pickers can pick with both hands. Under favourable circumstances in the height of the season, smart pickers can pick from 150 to 200 lb. in a day. Picking should not be begun until the dew has completely dried off the bolls, so that a day's work means from about 9 or 10 o'clock in the morning until 5 o'clock in the afternoon, including the dinner interval. When the crop is in full swing about January and February—*i.e.*, when the trees are loaded with fully-burst bolls, from which the cotton comes away easily at a light pull of two fingers and the thumb—six people of a family can pick at least 600 lb. a day, and usually much more. Suppose that a farmer has 10 acres under cotton, and, at a low estimate, has a 1,000-lb. crop, he

will have 10,000 lb. to pick. Then, if only 500 lb. are picked daily, the whole crop is gathered in twenty days. But at the first picking there will not be such an exuberance of open bolls; neither will there be full pickings towards the end of the season. Then wet days and necessary work on the farm must be taken into consideration. Given, however, a month, or six weeks even, in which to gather the whole crop, it will be seen that 10 acres can easily be managed by one small family besides paying attention to other crops.

PICKING BY HIRED LABOUR.

Advocates of cotton-growing are frequently confronted by the opinion that the cost of picking by hired labour would be a bar to the success of the industry. This is not borne out by facts, as the high wages now ruling for rural workers have not had the effect of reducing the area planted with cotton, but rather the reverse.

When the cotton is picked, it should be taken to the barn or storehouse, and all bits of leaves, sticks, and damaged or immature cotton should be taken out. A process called "whipping" makes this work easy. It consists in throwing the cotton on to a wire-netted frame (½-in.). This gets rid of all sand, soil, stones, &c., which may be adhering to the fibre. Carelessness in this respect results in a charge of 1s. per 100 lb. for whipping by the ginner.

COST OF COTTON-GROWING.

The net return to the growers of the 1915-1916 crop was £7 14s. 9d. per acre.

The amount of seed required per acre ranges from 5 lb. to 10 lb.; and the Department supplies all applicants with the maximum of 10 lb. per acre, thus making allowance for misses, due to possibly defective seed or unfavourable weather conditions. It should be noted that the seed drills should not be deeper than 3 in., and that the land before sowing should be perfectly clean and in fine tilth; also, that after sowing it be kept perfectly clean, as the growth of the plants will be materially checked if they are smothered with weeds.

THE BEST VARIETIES TO SOW.

In Southern Queensland, the Uplands varieties produce the largest crops. Amongst the best are Russell's Big Boll, Durango, and Jones' Hybrid. The Durango was lately imported from the United States, and has proved a heavy bearer, as did also Russell's Big Boll.

For Tropical Queensland, Sea Island and Caravonica are profitable, but only on the coast, as they require much saline atmospherical moisture.

These cottons also require wider spacing owing to their spreading habit, and should not be planted closer than 7 ft. between the rows and 7 ft. between the plants in the drills. This necessitates topping and pruning.

INLAND LOCALITIES.

So far, the planting of cotton on the coast lands only has been dealt with; but it must not therefore be inferred that the plant will not succeed far inland. Splendid cotton has been produced in the inland Central District, as well as on the Southern and Western Railway Line beyond Toowoomba, also at Thargomindah and Barcaldine.

SUMMARY.

(1.) Uplands cotton will succeed to perfection in the Southern River Districts—such as Nerang, Coomera, Pimpama, Logan, Albert—and all along the coast to the extreme North. West Moreton has also been amongst the greatest cotton-growing districts in the past.

(2.) Cotton is a sun-loving plant. It does not demand a large amount of moisture, and general practice has shown that the necessary moisture is best supplied by deep cultivation of a fairly porous or well-drained soil.

(3.) The after cultivation of cotton is the same as that required for maize, mangolds, or any other crop on which machines can be used until the foliage prevents the passage of horses. Until then, the cotton crop must be kept thoroughly clean and the soil in good tilth.

(4.) The crop will come in about March, often earlier, and continue for three months at least.

(5.) Cotton is ready for picking when the bolls turn brown and burst open.

(6.) Picking should not begin in the morning until the dew has evaporated from the plant.

(7.) A man can pick 100 lb. of cotton a day, and, as the season advances, up to 200 lb.

(8.) The price paid for picking depends upon whether the grower does the picking with the help of his family, or hires outside labour for the work.

(9.) No black labour is required, even in Tropical Queensland. White pickers can do better than coloured men.

(10.) The lowest Queensland average crop is 1,000 lb. per acre; and under favourable circumstances 2,000 lb. and even more have been harvested.

(11.) One thousand pounds of seed cotton will yield from 300 lb. to 400 lb. of lint (ginned cotton).

(12.) An advance of 2d. per lb. for cotton in the seed will be made to growers who deliver their cotton to the State Ginnery during the next three seasons. When the cotton has been ginned and sold, all profit derived, after the ginning expenses have been paid, is divided amongst the growers in proportion to their supplies.

(13.) Comparing the returns from maize, wheat, and cotton, the final results are distinctly in favour of cotton. The expense of a cotton crop from seed time to harvest is far less than the expense of either cereal crop. Maize and wheat require to be threshed after pulling, husking, reaping, and binding. Cotton demands no outlay beyond the cost of picking; whilst cartage and bags are incident to all three crops.

(14.) When the cotton is picked, it should be exposed for a few hours to the sun, to extract any moisture which may be in it.

(15.) When the crop is finally gathered, cattle may be turned into the field, the exhausted cotton plant furnishing a quantity of nutritive fodder.

(16.) The cotton plant may be pruned, when the following crop will come in a month or more earlier; but, considering the cost of labour, it is more profitable to plough out the old plants and resow.

DISEASES AND INSECT PESTS.

In the older cotton-growing countries there are several fungoid diseases and insect pests, few of which have ever appeared in the Queensland cotton fields. The worst enemy of the plant in this State is the boll-worm, which bores a hole into the immature boll and destroys the fibre. The dreaded boll weevil—which has cost the United States of America £14,000,000 in the attempt to eradicate it, but which still continues to ruin the cotton fields in that country—is unknown in Queensland; neither has the American red cotton stainer nor the leaf-eating cotton worm appeared. A brilliantly-coloured, shield-shaped bug, which is often seen on the opened bolls in Queensland, is practically harmless.

The best remedy against the boll-worm is to plant trap crops. The worm prefers maize to any other plant; and this gives the cotton-planter a means whereby he may protect his cotton from their depredations. The plan to adopt is as follows:—Between every 25 rows of cotton, 5 rows are left vacant, 1 of which is planted as soon as possible with early-maturing corn. When the ear silk appears, examination must be made for the eggs of the moth; and when these are removed and no more appear, the whole plant is cut down and may be fed to stock. Now plant 3 or more rows of corn, or alternate corn with cow-peas. The peas should come into full bloom at the time the corn is silking. This means that the peas must be planted when the corn has appeared above ground. The 3 rows of corn should be silking in December. Upon the ears of these corn plants a large number of eggs will be found; and these should be allowed to mature, in order to prevent the destruction of the natural enemies which are parasites on the eggs and worms. The hosts of worms are also cannibalistic and devour each other. No destruction

of these ears is recommended till the whole generation has been parasitised. The fifth and last row of maize is then planted to catch the eggs of the few moths which have matured, and these are destroyed by burning. The success of the trap crop depends entirely on having the corn in tassel in December; and it must be planted considerably later than the normal time of planting in spring.

ENCOURAGEMENT OF COTTON-GROWING BY THE DEPARTMENT OF AGRICULTURE.

As far back as 1904, in consequence of a short crop of cotton in the United States of America, the Department imported cotton seed, and about 100 farmers in the Southern Districts availed themselves of the opportunity afforded them to obtain seed gratis. The results were highly satisfactory to those who took the trouble to carefully cultivate the crop, notwithstanding the drawback that much of the seed was not sown till December. No farmer received less than £5 per acre for his seed cotton, and some got as much as £16 per acre. The general average cash return amounted to £9 9s. per acre gross.

For the past two years the Department has distributed local and imported cotton seed to farmers, and in 1915 advanced to the growers 1½d. per lb. for their crop, and in 1916, 1¾d. per lb., these advances being subject to a further payment of all profits derived from the sale of lint and seed, after all expenses have been deducted. The result was, that growers of the 1915-1916 crop obtained a price of 2.54d. per lb. for their cotton in the seed. The amount of lint (ginned cotton) from the crop gathered in 1917 was approximately 33,000 lb., which was sold locally at 11d. per lb. The growers have received the advance and will also receive all profit accruing from the sale, less charges, bringing their return to probably 3½d. per lb. for their cotton in the seed. At the time of writing, the final results of the ginning were not available and can only be given approximately.

For the 1917-1918 crop, and for the ensuing two years, the advance will be 2d. per lb. for cotton in the seed.

The Department has done much to foster the industry, by erecting ginning machinery, undertaking all marketing and transport, importing seed of the best kinds, distributing it gratis to intending growers, publishing and distributing gratis to all prospective and present growers literature up to date on the whole business of cotton-growing, and generally entering into the business of once more establishing on a firm basis an industry which, in 1871, when the farmers had no such assistance, brought in £79,317 from 2,602,100 lb. of cotton exported—the produce of 12,963 acres.

Between the years 1866 and 1873, the quantity of cotton exported from Queensland amounted to 10,324,433 lb., of a value of £427,596; and this without any assistance such as is now afforded by the present Government.

WHAT SOUTH AFRICA HAS TO SAY ABOUT COTTON CULTIVATION.

Mr. W. H. Scherffuis, M.S., Chief, Tobacco and Cotton Division, Union of South Africa, wrote as follows in the "South African Journal of Science" of December, 1916:—

"*Cotton as compared with Mealies* as a Drought Resister.*—It has been proved repeatedly that cotton is far superior to mealies as a drought resister. We have a number of instances on record where farmers planted a portion of their lands to mealies and a portion to cotton; the drought was so severe that the mealies came to nothing, while the cotton gave a fair yield of lint. Last May, I had a report from a farmer in the Waterburg district, who informed me that last season he planted 400 acres to mealies, and, on account of the severe drought, he reaped nothing. He had 2 acres planted to cotton, and he reaped 1½ tons of cotton. This farmer intends to plant 200 acres to cotton next season. I have had many similar cases reported. These results obtained by farmers verify results obtained at our experiment stations.

"I should like to make it clear, however, that the first few weeks after the seed is sown is a very critical period. The young plants must have a moist soil until they are well established, after which they will stand a lot of drought, and still recover to a considerable extent when the rains set in again.

"*Profits in Cotton Culture compared to those in Mealie Culture.*—The average yield of mealies per acre in South Africa is about four bags; placing the value at 10s. per bag will give a total profit of £2 per acre, or a net profit of about £1 per acre. A cotton crop of only 600 lb.† of seed cotton would give 200 lb. of lint; placing an average value of 6d. per lb. on it will give a gross profit of £5 per acre, and a net profit of approximately £2 10s., and there are still 400 lb. of seed left, which, if ground, make an excellent stock food. If a larger yield of mealies or cotton is obtained, the relative values will increase in about the same proportions as those given above.

"*Varieties Suited to South Africa.*—In the middle or bushveld, some of the American varieties, such as Cleveland, Bancroft, Pullnot, Russell's and Bohemian give the best results. In the low veld, where the soil is very fertile, and on portions of the coastal belt, such as Natal and Zululand, Cook's Long Staple, Nyassaland, Allen's, and Sunflower, have given the best returns. A new variety, Taylor's Long Silk Staple, is being bred at the Rustenburg Station; this variety has a beautiful long, silky staple, a scant foliage and upright trees, which are all points in its favour, but whether it is going to be superior to some of the old-established varieties we are not yet ready to state.

"All of the above varieties are annuals,‡ and should be resown every season. I have heard of a few instances where farmers have

* Mealies means maize.

† An average crop in Queensland is 1,000 lb. of seed cotton, and over 2,000 lb. have been harvested from an acre.

‡ The Caravonica which was evolved by Dr. Thomatis in Queensland is not an annual, and, like other tree cottons, is pruned with good results.—Ed. "Q.A.J."

ratooned (pruned or cut back) their cotton trees and left them over for the second season with good results, judging from their reports. When this is done the second crop of cotton usually yields a shorter and inferior lint. A perennial variety by the name of Caravonica has been tried in many parts of the Union, but the results have been very disappointing, especially in the interior. Our records show that a few farmers have been successful with it, particularly in humid coastal areas. Mr. Loffler, of Zululand, is reported to have obtained good results with this variety.

"*Does Cotton Impoverish the Soil?*—In theory, cotton could be grown continuously on the same soil, provided the stalks and seed are returned to the soil, as the lint is almost a pure hydrocarbon. In practice, we usually burn the stalks to prevent insects from harbouring in them during the winter, and the seeds seldom find their way back to the same land; therefore a rotation of crops is advisable, as it keeps the soil in a better physical and chemical condition. Cotton is the least exhaustive of soil fertility of most commercial crops grown in South Africa; for example, cotton requires in fertilising elements approximately two-thirds as much as wheat, one-third as much as tobacco, and a quarter as much as mealies.

" In a series of fertiliser and rotation experiments we found that phosphates gave better results than either nitrogen or potash, but a complete fertiliser gave far better results than those obtained from the application of any one of the three elements. Similar results were obtained from tobacco, mealies, forage, and legumes, which indicated that the soils were deficient in phosphates."

THE COTTON OUTLOOK.

The American requirements for cotton for the coming season will be about 7½ million bales for the local mills, including linters and cotton used for munition purposes. It is apparent that the world's surplus of American cotton at the end of the season will be exceptionally small, and in view of American requirements, the supply outlook is a disconcerting one. As America will use 7½ million bales this season, this will only leave 5 million bales for the rest of the world. Whether the war continues another twelve months or not, there is every probability of a cotton shortage. The world's consumption is hardly likely to fall below 14,800,000 bales if the cotton can be obtained, although with the smaller acreage placed under cotton this season than last, and the admittedly poor start the cotton has obtained, a yield equal to the probable demand is unlikely. Cotton is in an undoubtedly strong position, and there seems no reason why a change should come about. In the middle of July last, "Middling" American was quoted in Liverpool at 19d. per lb., and " Fairly good" Egyptian, at 31.10d.—" Cotton," Manchester, July, 14.

FARMERS' EXPERIMENT PLOTS IN THE CENTRAL DISTRICT.

G. B. BROOKS, Instructor in Agriculture.

SORGHUMS.

An article was contributed to the "Journal" for October, 1916, giving the results obtained from the Grain or Dry District Sorghum experiment plots conducted in the southern district for that year, together with some general directions in regard to the culture of this crop.

It was intended to carry out similar tests in the Central District during the present year on a much more extensive scale, but on account of unforeseen circumstances arising through the war, only three plots, out of the twelve proposed, were arranged for.

As pointed out in the previous article, the main objective in growing this crop is to ascertain its grain-producing qualities in comparison with maize, which under the varying climatic conditions obtaining over most of our agricultural areas is a somewhat inconsistent yielder.

The 1916 season was favourable in this respect, for in localities where the maize crop failed on account of the absence of rain, yields as high as fifty bushels per acre were harvested from the grain sorghums, thus upholding their reputation as dry district grain-producers.

Fortunately, the 1917 season was an unusually moist one; therefore, further data in regard to their drought resistance could not be ascertained. Other important factors were, however, secured, such as the yield of grain and green material under moist conditions, and the effect of a wet season on the varieties having compact seed heads.

As the grain sorghums are also likely to be of some importance as fodder-producers, a comparison was made by including three fodder varieties in the test.

Location of Plots.

Two were situated adjacent to the Dawson Valley Railway line, the other being at Capella, on the Clermont Railway line. The former is some 90 miles, and the latter 200 miles from the coast. One of the Dawson Valley plots was on the farm of Mr. F. Medlon, Deeford. The land was recently cleared brigalow scrub, the soil being of a brown loamy nature.

The other plot was on the farm of Mrs. M. Carnell, Wowan. This was forest land, adjacent to the Dee River; the soil being a sandy loam, rather inclined to bake.

The plot at Capella was sown on Mr. A. S. Bailey's property, the land being rolling downs country and the soil a dark loam.

Date of Planting.

Sowing was carried out at the respective centres during the third week in December. The grain was planted in rows three feet apart, three to four pounds of seed being used per acre.

Climatic Conditions.

No exact rainfall records were obtainable, but at each centre the amount of moisture was undoubtedly more than met the needs of the crop. During the period of growth the rainfall in the Dawson Valley was estimated at some 18 inches, while at Capella it was in the neighbourhood of 24 inches. It may be mentioned that the rainfall on several of the plots during 1916 did not exceed 4 inches.

Harvesting.

In the Dawson Valley the Amber and Saccharatum varieties were harvested during the first week in April, and other sorts a fortnight later. At Capella the respective varieties required a month longer to mature.

Yield.

The moist season was responsible for an exceptionally heavy growth of stalk. This fact is made apparent by the increased weights of green material secured, practically double that obtained during 1916.

[Accompanying the above are some very interesting graphs, one showing the variation and yield of grain obtained per acre in the respective districts, another gives the variation and yield of green material per acre, while the third shows the average yields obtained both in grain and green stuff for 1916 and 1917. It is regretted that owing to exigencies of space these graphs have to be omitted, as also those of Feterita at Wowan, Giant Honduras Sorghum at Mount Larcom, and a general view of the experiment plot at Deeford.]

Stud Plot.

In adidtion to the variety tests, a Stud plot, with "ear to row" test, was also arranged for on the farm of M. Carnell, Wowan, the variety grown being Standard Milo.

On account of the very favourable season, the growth was so rank as to cause lodging, making harvesting operations both tedious and difficult. The weight of green material was at the rate of 25·3 tons per acre, and the yield of grain 64 bushels. Unfortunately, the "ear to row" tests (10 in number) were so tangled up that the securing of reliable data was impossible.

Selecting Stud Seed.

In regard to fodder varieties, so far little attention has been paid to grain production. In securing seed for the 1917 plots, a selection was made from both a grain and fodder point of view.

This has undoubtedly been the means of very materially increasing the grain production of those sorts. The average yields for the fodder varieties for 1916 was 25·6 bushels per acre, while for 1917 this jumped to 52. The increase for the grain varieties was also a substantial one, the average for 1916 being 50·8, and for 1917, 70·2 bushels. In securing seed for the coming season's stud plots, and "ear to row" tests, the average weight of the ears selected shows a marked increase over those threshed out for the past season's (1917) operations. The following are

the average weights of the ears of the respective varieties selected both for 1916-17, and 1917-18:—

Variety.	1916–17.	1917–18.	Heaviest Head in Selection—1917–18.
	Oz.	Oz.	Oz.
Crossbred. No. 1 Selection	7·0	11·8	13·0
„ No. 2 Selection	..	10·0	10·5
Giant Honduras	..	6·8	8·5
Cream Milo	4·8	5·9	7·5
Feterita (Sudan Dhourd)	4·0	5·6	6·8
Planters' Friend	3·0	5·1	6·8
Standard Milo	4·2	4·9	5·5
B.H. Kaffir	3·4	4·7	6·8
Dwarf Milo	4·2	4·9	5·0
Shantung Dwarf	3·2	3·6	4·0
Saccharatum	2·5	2·9	4·3
Amber	1·5	1·8	2·0

It will be noted from the above that the cross-breds selected have exceptionally heavy seed heads, thus giving much promise in regard to increased grain production. Several undesirable features will no doubt have to be guarded against, such as spreading habit, late maturing, astringent grain.

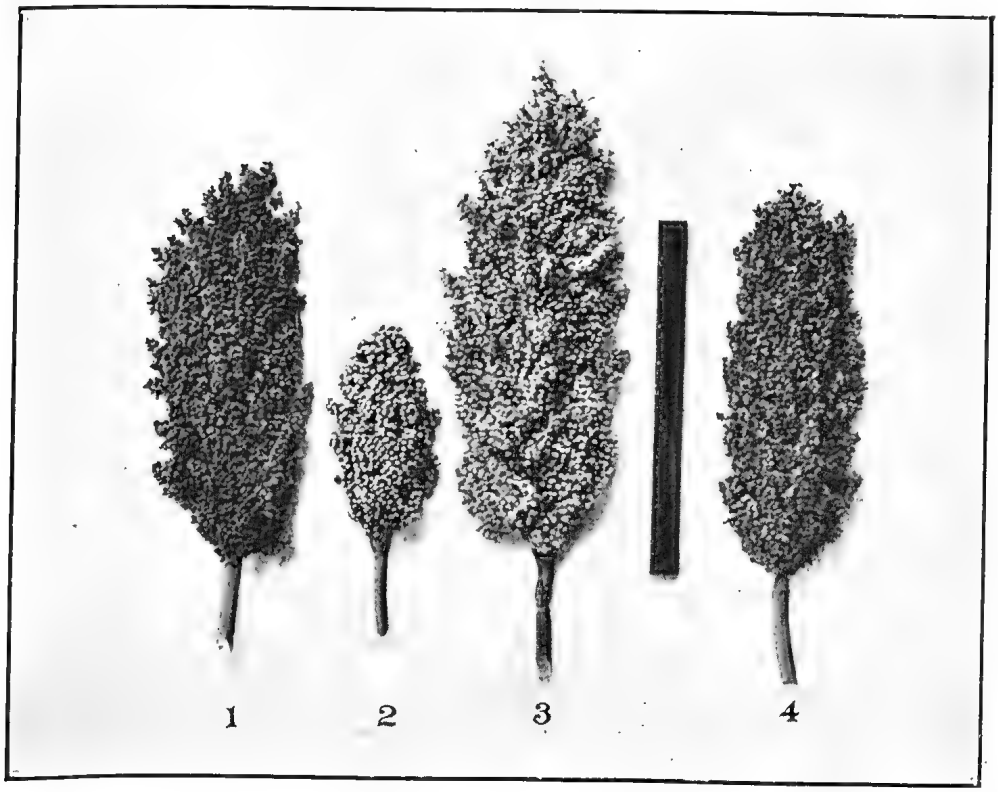
Cross-bred plants producing white grain is somewhat unusual, the colour invariably being from a light to dark red, somewhat similar in appearance to Standard Milo. There is a wide variation in the colour of the hull; in some plants it is a light grey, in others amber, while a glossy black is not uncommon.

The photographs on page 197 show different types of cross-bred heads and the relative size between them and a large head of the Cream Milo variety. The measure lying between Nos. 3 and 4 is 1 foot in length.

Adverse Factors.

The quality of the grain was not affected in any way by the heavy rains, but in the districts more adjacent to the coast the maize caterpillar did some damage to the high-yielding compact-headed varieties, more particularly the Cream and Standard Milos. Feterita was affected to some extent, and to a lesser degree B. H. Kaffir. In the Emerald District (Capella and Gindie) the pest was not much in evidence. Its attack on the maize crop was in several localities also much more severe this season than is usual. In the event of its recurrence the breeding of heavy yielding varieties, with a more open seed head, which is less liable to attack, may have to be considered. It may also be desirable, in view of the fact that this crop is likely to be raised largely for grain production, to give more attention to the propagation and improvement of high-yielding dwarf sorts.

A number of sorghum varieties, including those experimented with, were grown during the past season at both the Warren and Gindie State Farms as an ensilage crop. Very heavy yields were obtained at both places. Mr. Burnage, manager of the Gindie Farm, stated recently that he had already secured two heavy cuttings from his sorghum paddock, and had hopes of getting another within twelve months of planting, with further cuttings next season.



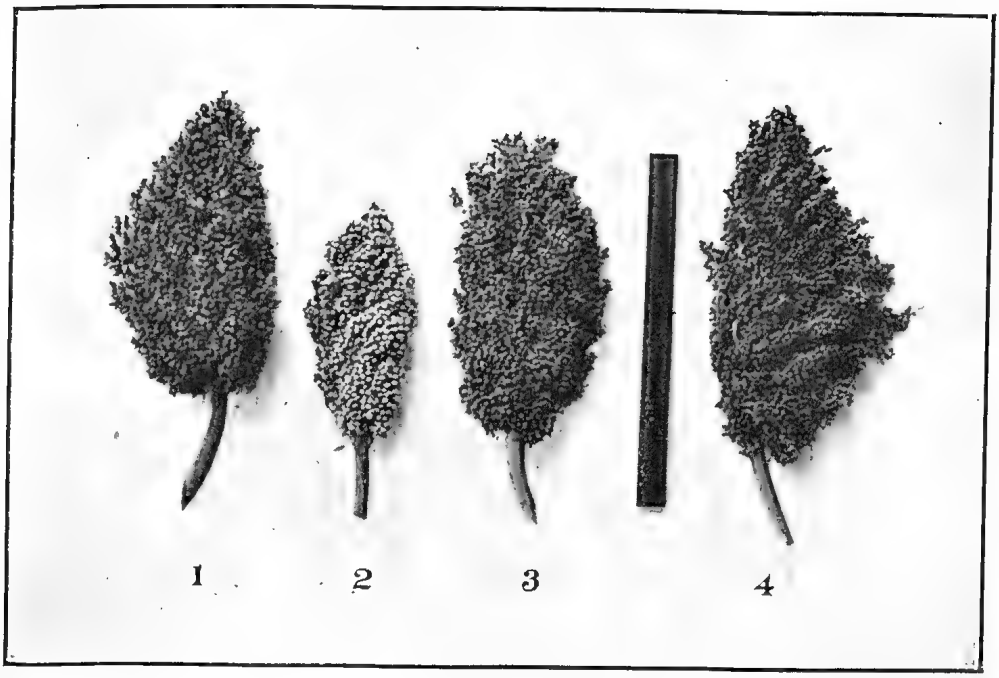


Plate 23.—Types of Cross-bred Heads.

CORN-GROWING COMPETITION, 1917-18.

1. This competition will be open to all under the age of eighteen years who are residents of the State of Queensland. An entrance fee of 2s. 6d. must be forwarded to the Under Secretary with the application to enter.

2. Applications to be enrolled in the competition, containing the following particulars, must be forwarded to the Under Secretary, Department of Agriculture and Stock, Brisbane, to reach him, if possible, not later than 29th September, 1917:—

(*a*) Full name and address. (Give Christian names in full.)

(*b*) Date of birth. (Day, month, and year.)

(*c*) No. of Division in which applicant resides, and the name of the Dairy Inspector who supervises the locality.

3. The area to be devoted to the planting of the seed maize shall be one-tenth of an acre, selected seed for which, 1¼ lb. of Improved Yellow Dent, will be posted, free of cost.

4. Each competitor shall have absolute freedom in his choice of ground, and in the methods he may adopt in preparing, planting, and cultivating his plot; but in no case shall a plot exceed one-tenth of an acre. Yields will be calculated, when judging, on the basis of this area.

The following table shows the length the rows must be to give the exact area according as four, five, six or more rows are planted:—

No. of Rows Four Feet Apart.	Length of Rows in Feet.	No. of Rows Four Feet Apart.	Length of Rows in Feet.
4	272 ft. 3 ins.	8	136 ft. 1½ ins.
5	217 ft. 10 ins.	12	90 ft. 9 ins.
6	181 ft. 6 ins.	16	68 ft.
7	155 ft. 7 ins.		

5. Each competitor will be required to keep a record chart showing the dates and particulars of the different stages of work, and these charts must be delivered, at the time of harvesting, to the officer appointed for superintending and verifying the yield, and this officer will post them on to Brisbane.

6. Within seven days from the verification of the yield from the crop, each competitor shall select, without aid from other persons, twelve uniform cobs of the maize from his crop, and forward them, with a letter of advice, to the Department of Agriculture and Stock, Bris-

bane. (The cobs should be packed in straw envelopes, commonly used in packing beer bottles, and then placed tighly in a case which should be labelled and branded with the initials of the competitor and the number allotted to his district.)

7. Competitors must notify the Dairy Inspector for the district of the date when the crop shall have matured and be ready for inspection. *Unless this rule is observed the competitor will be disqualified.* The maize must be thoroughly dry and ripe when harvested.

8. No competitor shall be allowed to employ or permit any labour upon the competition plot standing in his name, other than his own personal labour, excepting in relation to the driving of horses, for which, owing to circumstances, such help may be needed.

9. The competition will close on the 30th June, 1918, and the prizes will be allotted thus:—

The competitors will be grouped according to the following divisions:—

(1) The district supervised by—
Mr. E. W. Ladewig, Dairy Inspector, Beenleigh.
Mr. H. C. Gordon, Dairy Inspector, Harrisville.
Mr. R. K. Henderson, Dairy Inspector, Rosewood.

(2) The district supervised by—
Mr. C. C. Pickering, Dairy Inspector, care of Miss Macpherson, Montague road, South Brisbane.
Mr. R. G. Ridgway, Dairy Inspector, Ellerslie Crescent, Taringa, Brisbane.
Mr. R. Winks, Dairy Inspector, Gympie.
Mr. J. A. Midgley, Dairy Inspector, Bundaberg.
Mr. W. S. Harding, Dairy Inspector, Esk.

(3) The district supervised by—
Mr. J. H. Barber, Dairy Inspector, Crow's Nest.
Mr. J. P. Carey, Dairy Inspector, Gatton.

(4) The district supervised by Mr. S. K. Crowther, Dairy Inspector, Kingaroy.

(5) The district supervised by—
Mr. J. J. Carew, Dairy Inspector, Russell street, Toowoomba.
Mr. L. Verney, Dairy Inspector, Newtown, Toowoomba.
Mr. J. R. D. Munro, Dairy Inspector, Warwick.

(6) The district supervised by Mr. D. Downs, Dairy Inspector, Gayndah.

(7) The district supervised by—
Mr. J. Cattanach, Dairy Inspector, Dalby.
Mr. R. S. Sigley, Dairy Inspector, Roma.
The Stock Inspector, Goondiwindi.

(8) The Central District of Queensland, including that supervised by Mr. L. Moriarty, Dairy Inspector, Rockhampton.

(9) The Northern district of Queensland, including that supervised by—
Mr. G. A. Smith, Dairy Inspector, Mackay.
Mr. S. A. Clayton, Dairy Inspector, Yungaburra.

10. Three special prizes of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

DISTRICT PRIZES.—1st, £5; 2nd, £2; 3rd, £1.

If there are less than six competitors, prizes will be allotted as follows:—

Four or five competitors (inclusive), two prizes, first and second.

Two or three competitors (inclusive), one prize only, first.

When only one competitor, he or she will be debarred from participating in the District Prize, but will be eligible to compete for the Special Prizes.

NOTE.—It is in the interest of the Entrants to encourage others to compete for the valuable prizes being offered.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize.

No prize will be awarded unless the yield of corn equals twenty bushels per acre. This stipulation may be waived under very exceptional circumstances in the case of a lower yield.

11. The aggregate points will be 100, and the judging will be based upon the following:—

(*a*) Yield of plot	75 points
(*b*) Quality of maize produced	15 points
(*c*) Notes and records of plot	10 points

12. The Director of Agriculture will be the sole judge of the competition, and his decision shall be final.

WILLIAM LENNON,
Secretary for Agriculture and Stock.

Brisbane, 3rd September, 1917.

MARKET GARDENING.

HERB-GROWING.

BELLADONNA.

Amongst the herbs which might be profitably grown in the coast lands and high lands of Queensland where the autumn temperature does not rise much above 80 degrees F., is Belladonna, also called Dwale, or Deadly Nightshade (*Atropa Belladonna*), a tall, bushy herb of the natural order *Solanaceae*, growing to a height of 4 feet or 5 feet, having leaves of a dull-green colour, with a black shining berry fruit, about the size of a cherry, and a large, tapering root. The plant is a native of Central and Southern Europe. The entire plant is highly poisonous, and accidents have occurred through children and unwary persons eating the attractive-looking fruit. The leaves and roots are largely used in medicine, on which account the plant is cultivated, chiefly in South Germany, Switzerland, and France. Both roots and leaves contain the poisonous alkaloid Atropia. The percentage of Atropia in the roots ranges between 0.6 and 0.25, the roots of the young plants being always richest in the alkaloid. The percentage found in the leaves is much more uniform, being about 0.47, and extracts and tinctures of the leaves are therefore of much more constant strength than if prepared from roots.

The Uses of Belladonna.

Preparations of belladonna and atropia are used in medicine as anodynes in local nervous pains, and atropia is frequently hypodermically injected, but rarely taken inwardly. They are also of great value in ophthalmic practice on account of their peculiar property of producing dilatation of the pupil, either when painted around, or dropped into the eye. Belladonna is also used as an antispasmodic in whooping-cough and spasmodic coughs generally, and for various other medical purposes.

The following notes on the cultivation of the plant in California are published in Bulletin No. 275, December, 1916, University of California Press, Berkeley:—

"The soil on which the experiments were made consisted of a rich adobe and sedimentary loam, on which big crops of tomatoes had been grown for the two previous years. Seeding in the open proved a failure; seeds were therefore sown in cold frames, and they germinated in from six to over ten weeks. Although the temperature fell to below 27 degrees F. on two or three occasions, only some of the leaves of the young plants were killed, but the roots were unharmed. The plants were set out in the field in May, 1908, and in May, 1909, were ready for the first harvest. Owing to the dry, unfavourable season, the crop was light, and in July amounted to 355 lb. of perfectly dry and brittle belladonna from 1½ acres. A second crop was cut from plants of two seasons' growth, and brought the total, from 1½ acres, to 800 lb. of dry leaves and stems.

Although a shade plant, it thrives well in the open localities, having cool nights and considerable atmospheric moisture. Seedlings require abundant soil moisture, but when they are well rooted, soil moisture is not so essential.

Where the winter is not too severe, two, and perhaps three, crops can be gathered in one season. Extremely hot weather is harmful unless there is ample irrigation. A temperature which does not rise much above 80 degrees F. is best for the growth of the plants. Sunlight is even more important than temperature. Good, rich, well-tilled soil receiving 20 to 30 inches during the winter months, will ensure a good crop.

Belladonna is improved in yield by fertilisers. Lime appears to increase the alkaloidal content. The land should be ploughed to a depth of 9 inches, then crossed twice with the disc harrow.

The seeds may be obtained from America, but at the present war-time, not from Europe. The price per lb. is £4. The seeds are smaller than lucerne seeds. If kept in a dry place, they will retain their germinating power undiminished for three, and even four, years.

Transplanting.—Take up the seedlings. Cut off the dead tops and leave about 6 inches of the main root, with such side roots as may be present. In the field, cut a hole deep enough to receive root and crown, leaving only the dead stem remnant projecting above the surface of the soil. The crown part should be well covered, at least to the depth of an inch. Cover the roots and crown with fine soil, and tamp in the loose soil with the flat of the spade or hoe.

When transplanting the crown cuttings, the crowns are taken from the heeling-in bed and trimmed if necessary, the larger ones being cut into from two to five pieces. The smaller, single-rooted crowns are not divided. These cuttings are planted vertically and covered to a depth of three inches.

Cultivation.—Cultivation for the removal of weeds during the growing season depends, of course, upon the season and the growth of weeds. Certainly, no less than five or six cultivations should be made to keep the soil in good tilth, and as soon as the plants are large enough, the soil may be turned more and more towards the plants.

Irrigation.—As a general rule, irrigation is not required during the second, third, or fourth years.

Harvesting.—The herb is cut at the time of maximum flowering, at intervals between the first and second cutting, of three months. Heaps of four rows may be made if drying is done in the field. The stems should be cut at from 4 to 6 inches above the soil. It takes from five to six weeks for the herb to dry in the field, but a better plan is to leave the plants in the field for five or six days and then to dry them in a kiln at a temperature of about 120 degrees F.

If all the drying is done in the field, the heaps should be turned several times a week in the early morning before the leaves and small

branches have become brittle. When the leaves and all parts of the stem are brittle, they should be placed in a barn, where they should remain for another week or two preparatory to baling.

Baling the Herb.—When the herb is entirely dry, it is pressed into bales of 100 to 125 lb. each, either by means of a hand-power hay press, or by the usual horse-power. The bales are wired like hay or straw bales.

Harvesting the Roots.

So far, we have dealt with the harvesting of the leaves and steams of the plant. At the end of the fourth season, immediately after the second crop of tops (herb) has been cut, the roots, with the crowns, are taken up, usually by a plough such as is used for ploughing up sugar beets. They are then hauled to the drying place where the crowns, with about 3 inches of root, are removed, and the roots cut into lengths of 4 or 5 inches. The larger roots are split longitudinally once or twice.

Heeling-in the Crowns.—An area of ground is levelled, the soil being then removed to a depth of several inches. Set in the crowns as closely as possible and cover with soil to a depth of 2 inches. Here they remain until transplanting time. They should be lightly watered to keep them from drying out.

Drying the Roots.—The clean cut and sliced roots are spread on a board floor or hurdles to dry in the sun or in the kiln. If sun-drying is done, they should be raked together each night, and covered to keep out moisture. Sun-drying will take from three to four weeks. Kiln-drying at 120 degrees F. is preferable. Dried roots are packed and shipped in boxes or in sacks.

Roots and crowns are taken up once every four years. Four-year roots are not of as high quality as third-year roots.

Yield per acre.—As with other crops, the yield is variable. The first season's crop (two cuttings of the herb) should be 1,800 lb. net, dry weight. The second season's crop should be 1 ton, and the third season should yield from 2,100 to 2,200 lb. dry weight. The fourth year should yield 2,200 lb. of the herb, and not less than 1,000 lb. of roots, both dry weight.

THE BELLADONNA MARKET.

The demand for the dry herb, leaves, and root, is quite constant and is increasing every year. The United States requires about 300 tons of the drug annually. The European War has cut off the foreign supply almost completely, and as a result, the price has risen from about 12 cents (6d.) per lb. to one dollar (4s. 2d.) per lb. at wholesale.*

The Wholesale Market.—The grower should get in direct touch with the wholesale users of belladonna. There is no need of a middle man. One American manufacturing house uses over 80 tons of dried

* Belladonna was quoted in London in July, 1917, for leaves at 7s. 1d. per lb. wholesale.

drug every year. A grower should send samples (about 1 lb. of an average lot) to be submitted for chemical assay.

The Retail Market.—The retailers require leaves rather than stems, and it would not be possible to market hand-picked leaves profitably for less than 5s. per lb. (the present war-price is nearly 15s. per lb.).

FIELD ENEMIES OF BELLADONNA.

The enemies of belladonna are few. Amongst them are the cut-worm, root-rot, aphis, squirrels and gophers (ground squirrels). The aphis made its appearance on plants grown in the shade. None have been found on sun-grown plants. Sunburn of leaves does very slight damage. A wilting and browning of the basal leaves is usually an indication that it is time to cut the crop.

Mr. E. N. Ward, Superintendent of the Botanical Gardens, Sydney, in an article in the September issue of the "Agricultural Gazette" of New South Wales, describing a new drug plant (*Solandra longiflora*), which produces a valuable drug to which the name of "Solandrine" has been given, says—"It has the same active principles as 'atropine' which is produced from the leaves and roots of *Atropa belladonna,* or 'Deadly Nightshade.' But Atropa is difficult to grow in New South Wales, and it is a question whether, when it is grown, the leaves and roots when assayed for drug purposes will prove payable, for even in England, where the plant is largely grown, the uncultivated is preferable to the cultivated plant, whereas the Solandra will grow easily and quickly wherever West Indian plants will grow, which is almost anywhere inland and coastal where frost is not continuous and snow does not remain on the ground. The best method of propagation is by cuttings, for those root freely. The cuttings should be taken at the end of May from flowering 'wood,' just after flowering is over. The wood is then not too soft and not too hard. The cuttings should be put in nursery rows, in light, sandy soil, well drained, and when the ground where they are to be planted has begun to get warm in late spring they will be sufficiently rooted to plant out.

"When this new drug Solandrine becomes more widely known there will be a substantial demand for solandra leaves, and it will be a pity if growers of drug plants in New South Wales should be found still struggling with the cultivation difficulties, for belladonna leaves and roots will be largely superseded by the more valuable, and far more easily produced, *Solandra* leaves."

Mr. Ward mentions that by constant pruning it can be grown as a dwarf shrub, but if left unpruned it will make a rampant climber. One plant growing in Rose Bay at the foot of a Norfolk Island pine, 100 feet high, has grown to the top of this tree and flowers profusely from its branches. It is an accommodating plant, as it grows well in the driest and most hungry places, and does not appear to object to gross feeding. It makes an excellent hedge, but must not be planted where live stock can reach it, for it belongs to that most poisonous of plant families, *Solanaceæ,* and its tribe is Atropeæ.

Pastoral.

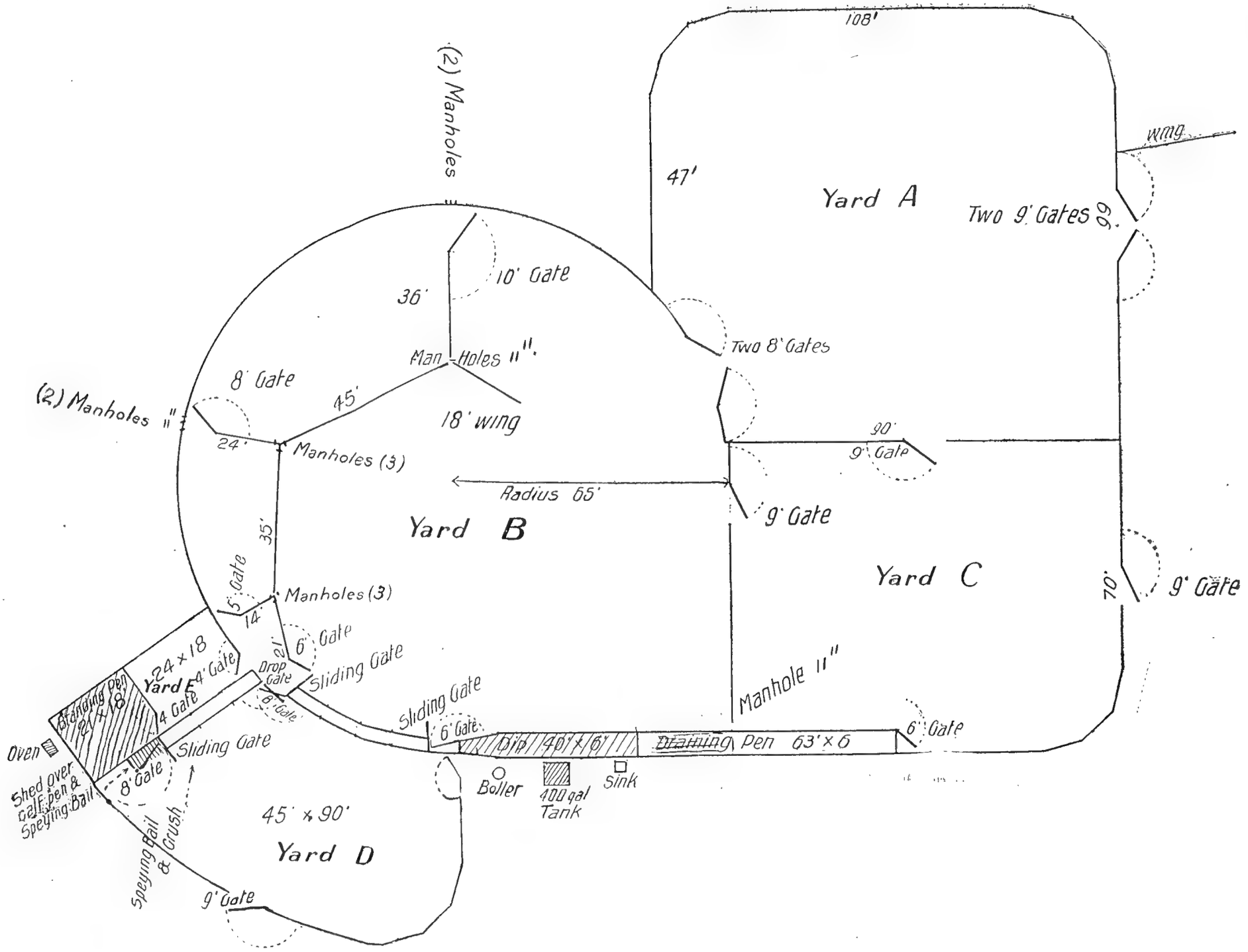
BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	4	38	Ayrshire Herd Book of Queensland
		..	2	Ayrshire Herd Book of Scotland
		2	9	Holstein-Friesian Herd Book of Australia
		2	31	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Friesian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Friesian Herd Book of Queensland
		2	..	Holstein-Friesian Herd Book of Australia
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book
H. M. Hart	Glen Heath Stud, Yalangur	7	21	Ayrshire Herd Book of Queensland



GROUND PLAN OF CATTLE YARDS AND DIP FOR BRANDING, WEANING, SPEYING, INOCULATING, AND DIPPING; TO HOLD 800 HEAD.

When the Yards are only required for Dipping, Yards D and E are omitted. For Dipping small numbers of Dairy Cattle, Yards A and C may also be omitted.

Plan of Yards drawn by Mr. E. D. WHITE (of Messrs. W. D. White and Sons), Bluff Downs, Charters Towers, where there are Nine Dips and 22,000 Head of Cattle regularly Dipped.

DIPPING CATTLE.

OPINION OF AN EXPERIENCED CATTLEMAN ON AN UNFENCED HOLDING CARRYING 17,000 CATTLE AND WORKING EIGHT DIPS.

It is over twenty years since ticks first made their appearance on the Burdekin waters, when we lost up to 60 per cent. of our cattle from tick fever. Those that survived, and their progeny, became immune to the fever, and this immunity remains with the cattle on all country that continues to be badly infested with ticks. So there are practically no losses from fever now. But the extent of the loss we sustain annually through tick worry is not generally realised. Although most cattle stations now have dips, with very few exceptions, no systematic and methodical attempts have been made to deal effectively with this pest.

After ten years' trial here we can emphatically say that in badly infested areas no investment offers such a reliable and quick return as money spent on dips and dipping.

To gauge in some degree the extent of the loss we are sustaining, compare the number of cattle carried on these runs before and after the coming of the tick. The average now is about half of that formerly. Convert that into terms of money to realise the loss to the community and State.

It is impracticable at the present time to talk of eradication, because of the impossibility of getting financial aid from the State and the high cost of fencing. But the Americans have proved it possible by clearing 475,000 square miles between 1906, when the work was undertaken there seriously, up to March, 1916. This task must be faced by us later, and because the conditions we will have to work under may make this harder, it cannot be shelved indefinitely on that score.

However, what concerns us vitally in the meantime is the necessity of suppressing the ticks and doing away with much of the poverty and mortality to stock now being caused by them. To undertake this work each one making the attempt will very soon have his own experience to guide him, but a few suggestions may not come amiss to those about to start.

First, put in a good wide dip 6 feet across at water line. This reduces all risks of cattle injuring each other to a minimum and has every advantage over the narrow dip when working big mobs of cattle. With a good incline and big wide steps on the walk out, the weakest cattle can be dipped with little risk. The draining yard should be long and from 8 to 12 feet wide. The cattle walk to the far end and stand quietly without horning and knocking each other about. Dips should be arranged in such positions on the run so the cattle will not be driven more than 7 or 8 miles.

The number of cattle that can be worked through one dip depends entirely on the carrying capacity of any particular area. But on the Tableland, so far, we have found about 2,000 the limit without having to drive too far. How often cattle should be dipped depends upon the

nature of the country, for whereas on certain runs on the Upper and Lower Burdekin it is found necessary to dip every three weeks through the year, there are other places within the tick infested area that find an occasional dipping suffices. In this men must be guided by their own experience. It is a bad policy to wait until the hair is coming off the cattle. Taking this Tableland country, we find that after a good burning in the spring and rain following in November and December the ticks are not much in evidence until the following April. It is not possible to dip regularly during the first three months owing to wet weather, but by April the wet season is usually over. This is the time, and from this on to July one can get good results from dipping. This is the very best time to work stock. The grass is good, everything strong, and the weather cool, and the ticks, if unchecked, are increasing at a great rate. Don't delay until the country is infested; catch them early while the cattle are strong and healthy, and keep the ticks off and the condition on, and give the breeders a chance to weather a severe winter and dry spring. One dipping then is worth more than four in August.

It is often contended that the losses from dipping weak cattle outweigh any gain. Our experience is quite the reverse. We never stopped dipping all through the 1915 drought, and not ten head stopped in the dip. Each dipping gave them a new lease of life, and we saved most of our breeders by it. Others say it is impossible to dip bullocks while fattening. This is wrong. It not only quietens them and makes them better to drove, but improves their condition and weight. It is not advisable to put cattle on the road immediately after dipping. They should have at least five days' rest in paddocks. Calves can be dipped from two weeks of age upwards, but the strength of the dip should be less than the accepted standard, to avoid any risk of loss.

As to the extra cost dipping entails, though almost as much benefit can be derived from dipping on big unfenced runs, better results can naturally be obtained where they are subdivided and not more than 1,000 to 1,500 cattle carried in one paddock. This allows the mustering to be done cleanly and systematically. Where eight stockmen used to look after up to 20,000 clean cattle formerly with fair success it requires treble the hands, at least, to work and dip effectively that number now. Six men can attend to 3,000 or 4,000 head. Bullocks require about one-third the attention that breeders do. Where no shoeing of horses is done (which involves a big addition to the work on basalt country) this estimate may not apply.

Now to meet this big increase in working stock under these conditions: Allow we save half the cows that die on the average annually from tick worry. This mortality on the Tableland is about 80 per cent. of the total females branded each year. The balance of 20 per cent. (over

the actual number if returns were forthcoming) are those cows sold and killed for beef. On a holding branding 2,000 calves, instead of turning off 200 cows, which very few do in that proportion, they should be marketing at least 500. These extra 300 cows alone at present values would more than compensate for all extra expenditure incurred. Then take into consideration the holding would carry 50 per cent. more stock with all the additional returns for an increased turn off and better class of bullocks.

E. E. D. WHITE,
Bluff Downs.

PURIFYING WATER FOR STOCK.

A simple method of purifying almost any water for drinking without boiling has been worked out by Dr. G. G. Naismith, director of the Health Laboratories of Toronto, Canada, and Dr. R. R. Graham, Assistant Chemist. The process is as follows:—Add a teaspoonful (not heaped up) of chloride of lime, containing about one-third available chlorine, to a cupful of water. Dissolve, and add in any convenient receptacle three more cupfuls of water. Stir and allow to stand for a few seconds in order to let the particles settle. This stock solution, if kept in a tightly stoppered bottle, may be used for five days. Add a teaspoonful to two gallons of water to be purified; stir thoroughly in order that the weak chlorine solution will come into contact with all the bacteria, and allow to stand for ten minutes. This will effectually destroy all typhoid and colon bacilli, or other dysentery producing bacilli in the water. The water will be without taste or odor, and the trace of free chlorine added rapidly disappears.

Water containing mud in suspension is easily clarified by dropping hot wood ashes into it, or by the application of lime or alum. These two substances make the water hard. Chloride of iron may also be used. It is quite harmless, and a valuable constituent for all animals. Medical men prescribe iron in one of its several forms as a tonic. One pound of chloride of iron (2d. per lb.) will clarify 1,000 to 2,500 gallons of muddy water, and much reduce the bacterial contents.

MUSHROOM KETCHUP.

Put mushrooms into large earthenware basin, sprinkle with plenty of salt. You may keep adding mushrooms for two or three days, and sprinkle more salt over them. Boil mushrooms and their juice for half an hour, strain, and for each quart of juice add ½-pint of vinegar, 1 teaspoon black pepper, ¼-spoon cayenne, some peppercorns, tablespoon sugar, cloves, a little bruised whole ginger. Boil 1 hour. Strain again, and bottle while hot.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Returns of Cows from 28th July to 27th August, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie's Lass	Ayrshire	5 July, 1917	1,239	4·0	58·2	
College Damsel	Holstein	12 July ,,	1,127	3·9	51·58	
Netherall Queen Kate	Ayrshire	30 June ,,	1,066	3·8	47·50	
Lilia ...	,, ...	11 July ,,	1,076	3·6	45·41	
Lady Melba	Holstein	14 Feb. ,,	931	3·6	39·28	
Confidence...	Ayrshire	25 June ,,	774	4·0	37·34	
Lady Margaret	,, ...	6 Jan. ,,	663	4·5	35·13	
Miss Security	Jersey	27 Mar. ,,	611	4·7	33·85	
Miss Bell ...	,, ...	27 June ,,	563	4·6	30·51	
Lady Prim...	Holstein	3 Aug. ,,	761	3·3	29·32	
Netherton Belle	Ayrshire	17 July ,,	695	3·6	29·31	
Princess Kate	,, ...	28 June ,,	629	3·8	28·02	
Lady Loch II.	,, ...	3 June ,,	612	3·9	28·00	
Buttercup ...	Shorthorn... ...	2 June ,,	685	3·4	27·20	
College Bluebell	Jersey	28 June ,,	723	3·2	26·98	
Glade ...	Shorthorn... ...	29 Mar. ,,	414	5·5	26·93	
Sweet Meadows	Jersey	8 Aug. ,,	370	5·6	24·50	
Hedges Madge	Holstein	22 Mar. ,,	551	3·7	23·88	
Iron Plate ...	Jersey	9 Dec., 1916	430	4·6	23·30	
Rosine ...	Ayrshire	21 June, 1917	557	3·1	20·12	

EXPERIMENTS WITH PEPSIN TO REPLACE RENNET.

D. W. STEUART, B.Sc. (University College, Cardiff.)

In view of the shortage and high price of rennet, the Agricultural Department of University College, Cardiff, decided to give pepsin a trial. A London firm kindly sent 1 oz. of their 1-3,000 soluble pepsin powder for that purpose. From this it was desired to produce a solution which would be as similar as possible in composition and strength to standard rennet extract, which could be used in exactly the same way as rennet, and which would keep. A 10 oz. dark-coloured bottle (a "poison" bottle from the druggist's) was thoroughly washed and scalded, then allowed to cool, and the 1 oz. of pepsin powder put into it. Then 50 grammes of salt, 5 grammes of boric acid, and 250 grammes of water were brought to the boil in an Erlenmeyer flask (water and salt often contain germs, so this treatment was necessary.) The brine was cooled to 105 degrees F., put into the bottle, corked with a new cork, the whole

shaken violently, and then, without any preliminary filtering, sent to the dairy to be tested. Miss Annie Pritchard, N.D.D., reported as follows: The solution gave a 17-18-second rennet test as against 22 seconds with rennet extract. On standing a sediment settled. When shaken up for use the solution was very cloudy. The pepsin solution was tested against rennet on four different days for making Caerphilly cheese. The pepsin acted in about 7 minutes, and the curd was ready to cut in 45 minutes; the rennet acted in about 15 minutes and the curd was ready to cut in an hour. Even then the pepsin curd was always the firmer when cut. Taking the four tests together, 16½ gallons of milk gave 18 lb. 9 oz. of curd with rennet, but 19 lb. 11 oz. of curd with the pepsin. The pepsin curd was therefore moister, due to the curd being firmer when cut. What remained of this unfiltered pepsin solution at the end of two months gave even a quicker rennet test, proportionately, than when it was new, showing that it had become somewhat stronger.

The solution was examined bacteriologically at the end of the first month. To three Durham's tubes containing MacConkey's litmus, lactose, bile salt, and peptone water, 1 c.c., 1/10th c.c. and 1/100th c.c. of pepsin solution were added, respectively, and the tubes were incubated two days at blood heat. There was no evidence of gas-producing coliform organisms. Then similar quantities of the pepsin solution were added to tubes of whey agar, plates were poured, and incubated three days at 37 degrees C. Not a single colony of germs developed, suggesting that the solution was almost or quite sterile.

A second ounce of soluble pepsin powder was purchased for 1s. 9d., and made up as before, but in the following proportions: 1 oz. pepsin, 68 grammes salt, 7 grammes boric acid, and 340 grammes water.

The whole was shaken violently. Next day the shaking was repeated. On the second day the solution was filtered through filter paper. The filtering took about 24 hours. The fluid was bottled as before and sent to the dairy.

Miss Pritchard's report this time was to the effect that the solution was fairly clear and showed no sediment. It gave practically the same rennet test as the rennet. It was compared with rennet for making Caerphilly, Smallholder and soft cheeses (Bondons, Pont L'Evéques, and Coulommiers). The results were entirely satisfactory, the pepsin solution and rennet being of equal strength and having the same effect.

A pair of Caerphilly cheeses made on 20th February, each from 2 gallons of milk, were sampled on 8th March. The two cheeses differed in weight only by an ounce. There was practically no other difference between the pepsin and the rennet cheese. The first batch of Caerphilly cheeses was sold to Mr. Richard Thomson of the Direct Trading Company at 160s. per cwt., the then ruling price for first quality Caerphilly. On the 22nd of March, Mr. Thomson examined the cheeses and considered all of them to be entirely satisfactory. Three pairs of cheeses made on 28th February, 1st March, and 6th March, respectively, were selected, and it was explained how they differed. Mr. Thomson was unable to

detect any difference between the rennet cheese and the pepsin cheese of each pair.

The trials suggest that a gallon of rennet solution of standard strength can be made by mixing the following ingredients:—

13⅓ oz. of the firm's 1/3,000 soluble pepsin powder;
2 lb. salt;
3 oz. boric acid; and
1 gallon water.

The brine must be cooled to 104 degrees F., after boiling, before dissolving the pepsin. The solution may be filtered after a day or two. It will keep well. With pepsin at 22s. per lb., a gallon costs 18s. 6d. The makers claim that 1 oz. of pepsin powder will curdle 300 gallons of milk. This is quite correct. It takes 12 oz. of standard rennet extract to equal 1 oz. of pepsin powder.—"Journal of the Board of Agriculture," England.

PICKLING ONIONS AND GHERKINS TO PRESERVE THEIR COLOUR.

The following methods for preserving the whiteness of pickling onions and the green colour of gherkins are described in the "Agricultural Gazette" of New South Wales of August 2:—"If the white colour that is appetising and attractive in pickled onions is to be retained, spices must be omitted. Choose the smallest onions which can be found, and, to facilitate the removal of their skins, pour hot water over them. Make enough strong brine to cover the onions, and put them into this as they are peeled. Let them remain there from one morning till the next; then replace this brine with fresh, and do the same on the third morning. On the fourth morning put the onions in fresh water, and heat them to the scalding point, stirring frequently. Milk addded to the water will help to whiten the onions during the boiling. Drain well, and place the onions in a jar, pouring scalding hot vinegar over them.

The first essential to success in pickle-making is good vinegar, strong and pungent. Do not use a copper vessel in any part of the process—a porcelain-lined preserving vessel is best. Vinegar boiled in a copper vessel forms acetate of copper, which is a poison.

To retain the green colour in gherkins, add parsley to the vinegar some days before it is required, and let it steep thus. The vinegar should acquire a decided green colour which will necessarily be imparted to the gherkins.

Take 200 gherkins, cover with cold water, to which a pint of salt has been added. Let them stand overnight. In the morning drain off this water, but measure how much is poured off. Then take a similar quantity of the prepared vinegar, add 1 oz. of whole cloves, 1 oz. of allspice, and a piece of alum the size of a walnut. Boil this vinegar and the spices, and pour it, boiling hot, over the gherkins. Cover with green cabbage leaves. A few green peppers in the vinegar give additional flavour and are a great improvement.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1917.

The month of August has been favourable for egg production, 9,375 eggs being the total for the month. In the light section, E. Chester's six pullets laid the highest monthly total of 149, but as the eggs are under weight, the monthly prize goes to C. Porter, with a total of 145 eggs. In the heavy section, E. A. Smith and A. E. Walters are equal for first place with 156 eggs each. R. Burns comes next with 151, G. Richter, C. C. Dennis, and Dr. E. C. Jennings have each had a bird treated for sickness. Broodiness has been rather prevalent amongst the heavy breeds in the group pens, but in one case only in the single heavy test. No case of broodiness has been recorded in any of the light-breed pens. Mr. R. Burns's F bird, competing in the single test, has put up the fine record of 143 eggs in 151 days, laying 77 eggs in the past 77 days, and is still in lay. This probably constitutes a record for continuous production. The following are the individual records:—

Competitors.	Breed.	August.	Total.
	LIGHT BREEDS.		
E. Chester	White Leghorns ...	149	639
*G. H. Turner	Do.	132	563
W. Becker...	Do.	131	555
G. Chester	Do.	137	534
F. W. Leney	Do.	143	534
C. Porter	Do.	145	531
W. R. Crust	Do.	128	531
T. A. Pettigrove, Victoria	Do.	126	515
Moritz Bros., S.A.	Do.	135	514
Oakland Poultry Farm	Do.	116	514
T. Taylor	Do.	128	497
*J. Zahl	Do.	111	488
T. B. Hawkins	Do.	126	487
*J. R. Wilson	Do.	117	486
*J. M. Manson	Do.	127	483
Kelvin Poultry Farm	Do.	138	478
J. G. Richter	Do.	120	473
Mars Poultry Farm	Do.	122	471
*A. T. Coomber	Do.	129	470
Quinn's Post Poultry Farm	Do.	133	470
*A. W. Bailey	Do.	106	465
D. Fulton	Do.	137	459
A. Shillig	Do.	140	459

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
LIGHT BREEDS—*continued.*			
C. Knoblauch	White Leghorns ...	126	457
A. H. Padman, S.A.	Do.	111	456
*Mrs. Munro	Do.	128	447
R. Holmes	Do.	110	430
*Dixie Egg Plant	Do.	106	414
F. Clayton, N.S.W.	Do.	124	409
J. L. Newton	Do.	127	408
G. Williams	Do.	122	402
Mrs. W. D. Bradburne, N.S.W. ...	Do.	138	401
Miss M. Hinze	Do.	101	400
*T. Fanning	Do.	128	394
L. G. Innes	Do.	125	391
G. Howard	Do.	137	382
E. Cross	Do.	134	378
*C. C. Dennis	Do.	103	378
J. Holmes	Do.	125	373
*A. E. Walters	Do.	116	372
G. J. White	Do.	126	372
Mrs. J. Carruthers	Do.	124	364
Mrs. S. J. Sear	Do.	132	356
S. C. Chapman	Brown Leghorns... ...	140	346
C. H. Singer	White Leghorns ...	121	344
E. A. Smith	Do.	124	344
C. P. Buchanan	Do.	120	336
J. Ferguson	Do.	127	335
*Dr. E. C. Jennings	Do.	99	289
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	151	595
A. E. Walters	Do.	156	564
W. Smith	Do.	142	547
*Mars Poultry Farm	Do.	140	526
F. A. Claussen	Rhode Island Reds ...	133	520
W. S. Hanson, N.S.W.	Black Orpingtons ...	128	486
*E. F. Dennis	Do.	144	471
Cowan Bros., N.S.W.	Do.	132	455
D. Kenway, N.S.W.	Do.	128	455
P. C. McDonnell, N.S.W.	Do.	124	443
H. Jobling, N.S.W.	Do.	119	422
Mrs. J. H. Jobling, N.S.W.	Do.	136	415
King and Watson, N.S.W.	Do.	112	380
*Oakland Poultry Farm	Do.	145	375
*E. A. Smith	Do.	156	364
R. Burns	S. L. Wyandottes ...	134	358
F. Clayton, N.S.W.	Rhode Island Reds ...	116	357
C. B. Bertelsmeier, S.A....	Black Orpingtons ...	129	357
E. Morris	Do.	140	353
*Kelvin Poultry Farm	Plymouth Rocks ...	134	324
C. C. Dennis	White Wyandottes ...	116	323
J. M. Manson	Black Orpingtons ...	146	320
*Miss M. Hinze	Do.	141	315
*F. W. Leney	Rhode Island Reds ...	123	281
Totals	...	9,375	31,600

* Indicates that the pen is entered in the single hen test.

DETAILS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
G. H. Turner	76	87	111	101	85	103	563
J. Zahl	98	69	102	36	105	78	488
J. R. Wilson	90	79	73	87	84	73	486
J. M. Manson	86	77	69	74	81	96	483
A. T. Coomber	90	30	94	89	75	92	470
A. W. Bailey	36	68	92	91	89	89	465
Mrs. J. R. D. Munro	110	67	66	65	46	93	447
Dixie Egg Plant	72	83	84	90	85	0	414
T. Fanning	38	73	77	71	56	79	394
C. C. Dennis	72	63	18	72	75	78	378
A. E. Walters	37	57	57	75	83	63	372
Dr. E. C. Jennings	20	28	54	65	84	38	289
R. Burns	73	64	106	86	123	143	595
Mars Poultry Farm	80	104	76	99	85	82	526
E. F. Dennis	81	71	93	96	99	31	471
Oaklands Poultry Farm... ...	95	53	52	42	93	40	375
E. A. Smith	56	49	49	93	63	54	364
Kelvin Poultry Farm	61	45	42	96	31	49	324
Miss M. Hinze	57	45	52	58	60	43	315
F. W. Leney	44	46	21	42	89	39	281

Weights of Eggs.

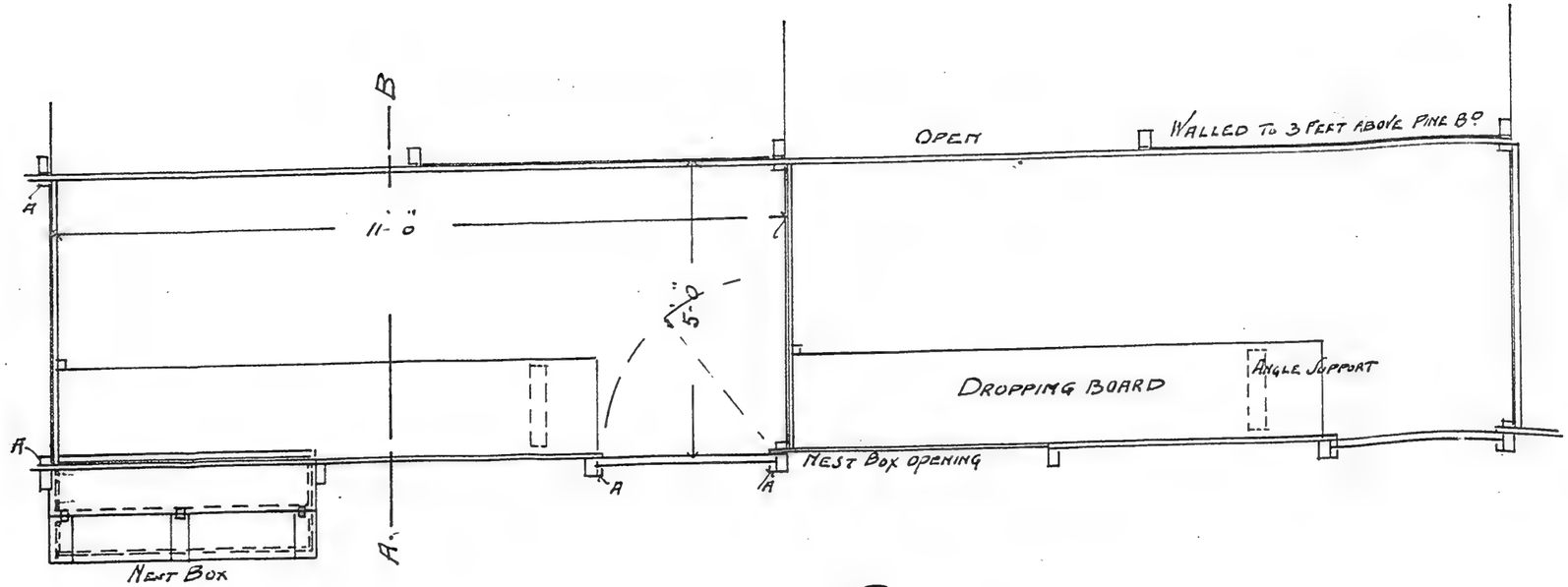
In accordance with the rules of the competition, the eggs of the birds have been weighed. In regard to this, weather conditions were unfavourable when the weighings were taken at the end of July, a high westerly wind blowing continuously for the most of the week. On this account a second weighing was carried out at the end of August for those whose eggs had been under weight in the first instance. In the group pens twelve or more eggs were weighed where possible, and for the single hens the object was to secure at least six eggs before the average was struck. It is very disappointing to find that so many are

below the standard of 24 oz. per dozen. The following table of results show the weight of the eggs to the nearest eighth of an ounce:—

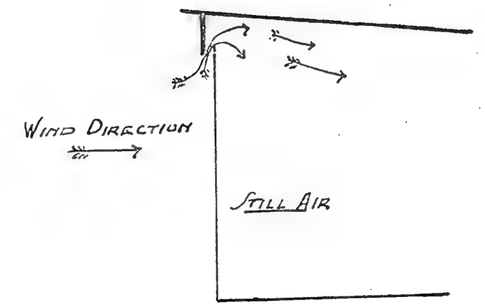
Pen.	Competitor.	Average Weight per Egg.	Pen.	Competitor.	Average Weight per Egg.
		Ozs.			Ozs.
1	Miss Hinze	2 1/8	28	R. Holmes	2 1/4
2	W. Thomas (Quinn's)	2	29	W. Becker	2
3	F. W. Leney ...	1 3/4	30	C. P. Buchanan ...	2
4	Moritaz Bros. ...	2	31	Mrs. Carruthers ...	2 1/8
5	T. B. Hawkins ...	2	32	G. Williams	2
6	G. W. Holland ...	2 1/4	33	Mars Poultry Farm	2 1/8
7	C. Porter	2	34	A. Shillig	2
8	T. A. Pettigrove ...	2	35	G. Howard	1 3/4
9	E. A. Smith	2	36	G. J. White	2 1/8
10	C. Knoblauch ...	1 7/8	37	J. H. Newton ...	1 7/8
11	J. Ferguson	2 1/8	38	H. Jobling	2 1/8
12	E. Chester	1 7/8	39	D. Kenway	2
13	D. Fulton	2	40	R. Burns	1 7/8
14	C. Chester	1 7/8	41	King and Watson ...	1 7/8
15	Mrs. S. J. Sear ...	2	42	Mrs. J. H. Jobling ...	2 1/8
16	L. G. Innes	2	43	P. C. McDonnell ...	1 7/8
17	C. H. Singer... ...	1 7/8	44	Cowan Bros.	2
18	E. Cross	2	45	F. Clayton	2 1/8
19	J. Holmes	2 1/8	46	C. B. Bertelsmeier ...	1 7/8
20	T. Taylor	1 7/8	47	A. E. Walters ...	2
21	Kelvin Poultry Farm	1 7/8	48	W. Smith	1 7/8
22	W. R. Crust	2	49	E. Morris	1 3/4
23	J. G. Richter ...	1 7/8	50	J. M. Manson ...	2
24	S. C. Chapman ...	1 7/8	51	C. C. Dennis	2
25	Mrs. W. D. Bradburne	2 1/8	52	W. G. Hansen ...	2
26	A. H. Padman ...	2	53	F. A. Claussen ...	2 1/8
27	F. Clayton	2			

SINGLE HEN PENS.

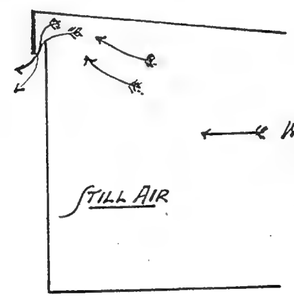
No.	Competitor.	A.	B.	C.	D.	E.	F.	Group.
								Oz.
1	C. C. Dennis	2 1/8	2	2	2 1/8	2 1/8	1 7/8	2
2	J. M. Manson	2	1 7/8	2 1/8	2	2 1/8	2	2
3	Mrs. J. R. Munro ...	2	2	2	2	2 1/8	2	2
4	A. E. Walters	2	2	2 1/8	2	1 7/8	1 7/8	2
5	G. H. Turner	2 1/4	1 7/8	2	1 7/8	2 1/8	2	2
6	J. Zahl	2	2 1/4	1 7/8	2 1/8	2	2	2
7	J. R. Wilson	2	2	2 1/4	2 1/8	1 7/8	2	2
8	T. Fanning	2	2	1 7/8	2	2 1/8	2	2
9	Dixie Egg Plant	2	2	2 1/8	2 1/8	2	...	2
10	Dr. Jennings	1 5/8	2	1 3/4	2	2	2	1 7/8
11	A. W. Bailey	...	2 1/8	2 1/4	2 1/4	2 1/4	2 1/8	2 1/4
12	A. T. Coomber	2 1/8	2 1/8	1 7/8	2	2 1/8	2	2
13	Mars Poultry Farm ...	2	1 1/8	2	2	1 3/4	1 7/8	1 7/8
14	E. A. Smith	1 1/8	2 1/8	1 7/8	1 7/8	2 1/4	2	2
15	R. Burns	2 1/4	2	2 1/4	2	2 1/8	1 3/4	2 3/8
16	Kelvin Poultry Farm ...	1 3/4	2	1 7/8	1 7/8	1 3/4	1 3/4	1 7/8
17	Miss Hinze	2 1/8	2	1 7/8	2	1 7/8	2 1/8	2
18	E. F Dennis ...	1 1/8	1 3/4	1 7/8	1 3/4	1 3/4	2	1 7/8
19	Oakland Poultry Farm ..	1 3/4	1 3/4	2	...	1 7/8	2	1 7/8
20	F. W. Leney	1 7/8	2 1/8	1 7/8	1 7/8	2	2 1/8	2

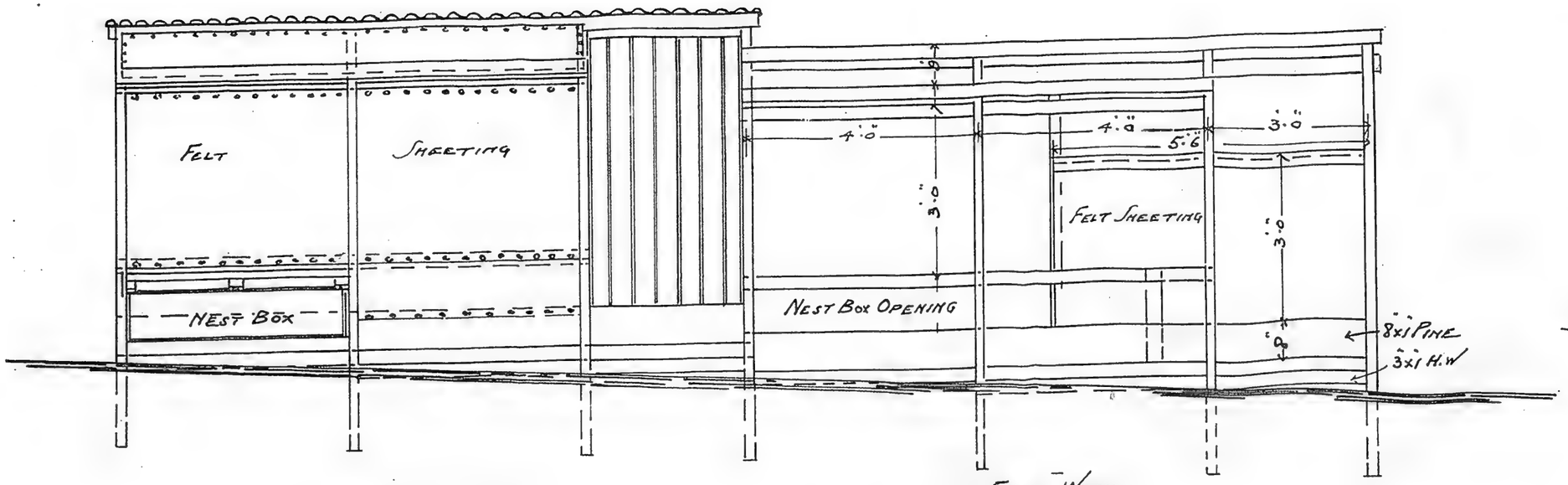


— No 2. PLAN —



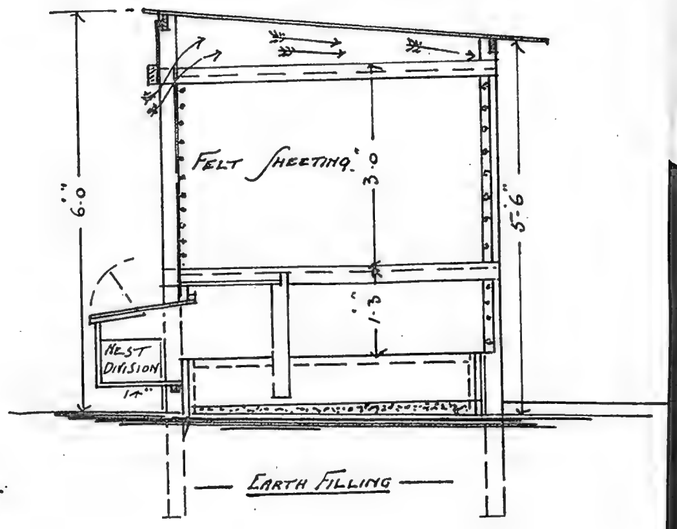
— No 5. DIAGRAMS- SHEWING VENTILATION SYSTEM —



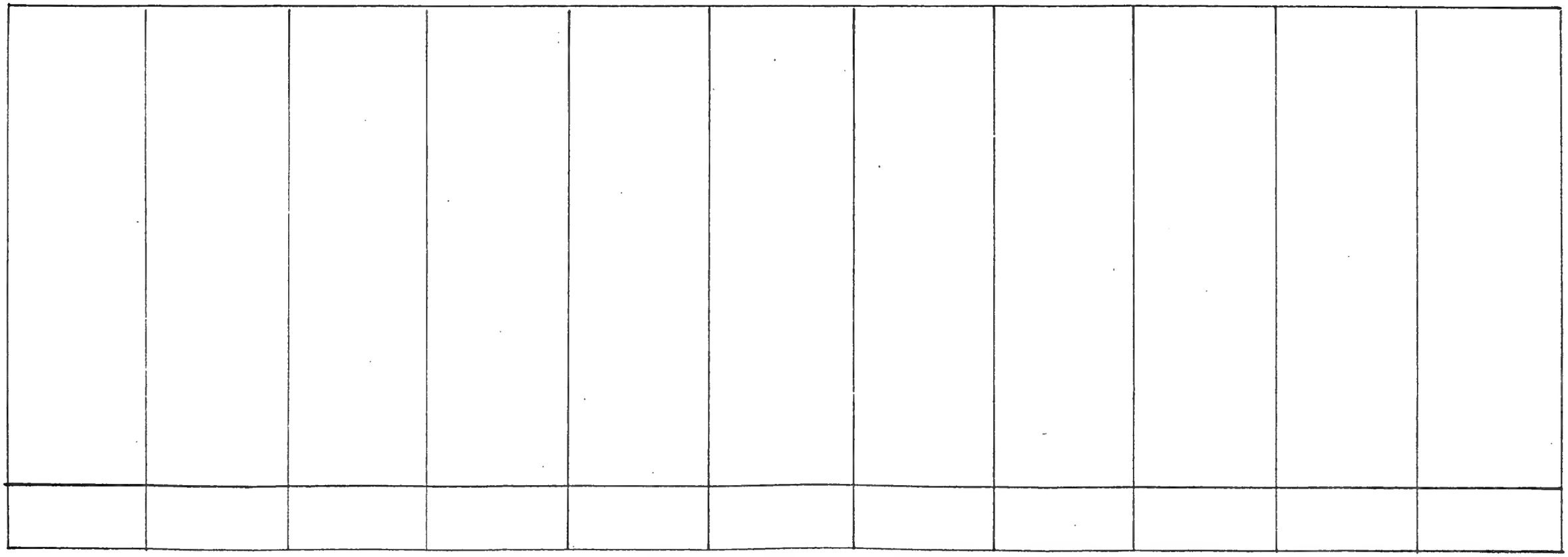


— COMPLETED HOUSE — — FRAME WORK —

— No 3. BACK ELEVATION —

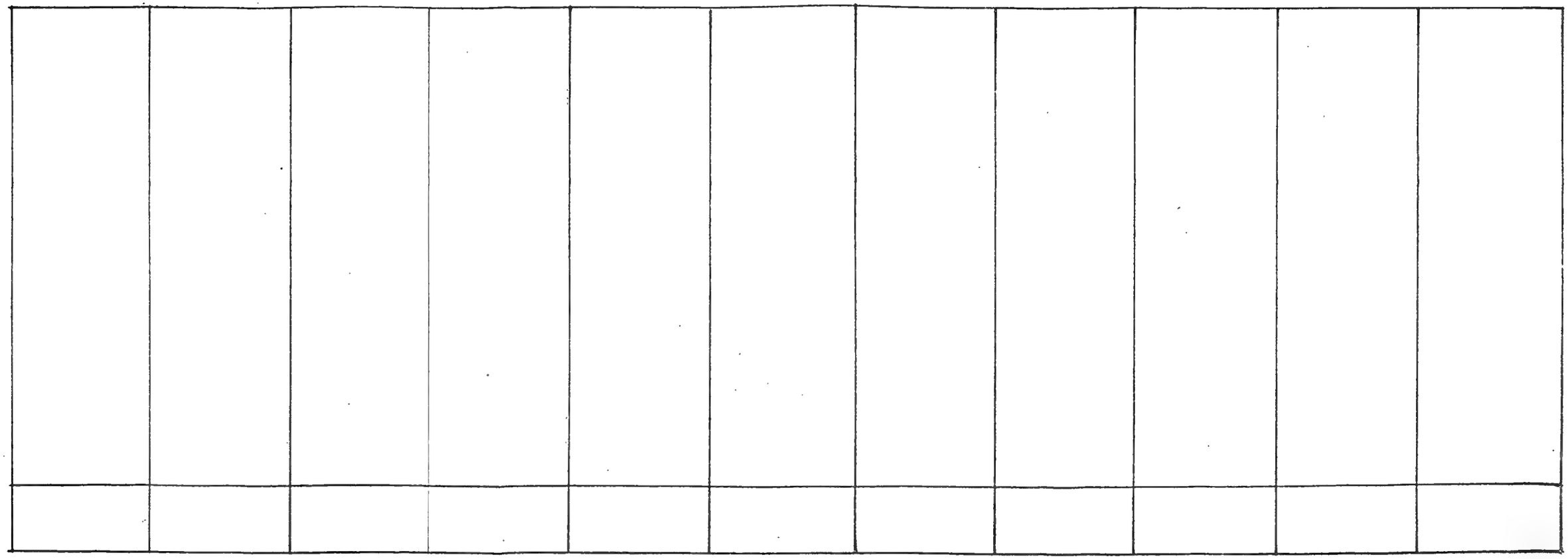


— No 4. VERTICAL SECTION ON A.B —



— PLAN SHOWING LAYOVT OF THE CONTINVOVS HOVSE SYSTEM —

— NO I. —



POULTRY BUILDING AND APPLIANCES DESIGNED AT THE QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

At the National Association's Exhibition, Brisbane, held in August, 1917, the College erected several full-size model poultry pens and had on view several useful poultry appliances. A number of novel features were embodied, and in the design the objects held in view were economy in construction, economy of labour in working, sanitation, and ventilation—all these points being considered in regard to the Queensland climate. In presenting the following plans and specifications, we quite recognise that the various designs are not perfection. Still, they are worthy of notice, and if they stimulate an interest in poultry building construction generally, they will largely have served their purpose, for we feel that it is a matter of importance for Queensland to evolve its own type of farm building, a type which must conform with our climatic conditions.

Poultry Pens.

The houses are constructed on the continuous system, the continuous back facing the weather, probably west or south-west; thus the fronts, which are only partially walled, face east or north-east. To each pen there is a small run, and the whole of the floor of each house is used as a scratching pen. All fittings, such as nest-box, dropping board, and perches, are detachable, and when removed, leave the inner walls of the house readily accessible for disinfecting. As far as possible, the houses and runs are worked from the back, and successive rows of houses are separated by lanes. (*See* Sketch No. 1.)

Construction of the Houses.

The houses shown are 11 feet by 5 feet, and are 6 feet high at the back, and 5 feet 6 inches high in front. The uprights are 3-inch by 2-inch hardwood, but may be of bush saplings. Around the bottom and on the inside of the sheds 3-inch by 1-inch hardwood battens are fixed to a distance of 2 inches or more above the ground level, so as to allow of the floor of the house being filled with good subsoil which can be wet and tamped down to a solid floor. Above the hardwood battens 8-inch by 1-inch pine boarding is fixed to retain the scratching litter. This boarding is also placed inside the studs. At the door the 8-inch board fits between fillets, and can be removed when cleaning out the litter. Above the pine boarding, 3-inch by 1-inch pine battens are fixed as follows:—At the back, extending from the door-jamb to the end of the building, the first batten is set 1 foot up, measuring to its upper edge. The second batten is 3 feet above this, both inside the studs. Half the foot interval is filled in with a foot wide strip of roofing felt, leaving the other half as an opening for attaching the external nest-box (*see* Plate). The whole of the 3-feet interval is similarly filled. The remainder is covered with a 9-inch strip of roofing felt, placed outside the studs, and attached at its upper edge to the roof plate and at its lower to a 3-inch batten fixed outside. By this means a weatherproof opening is created for ventilation. (See plan.)

This ventilation system is specially to be recommended, as the vertical opening creates a draught even on still days. With a wind

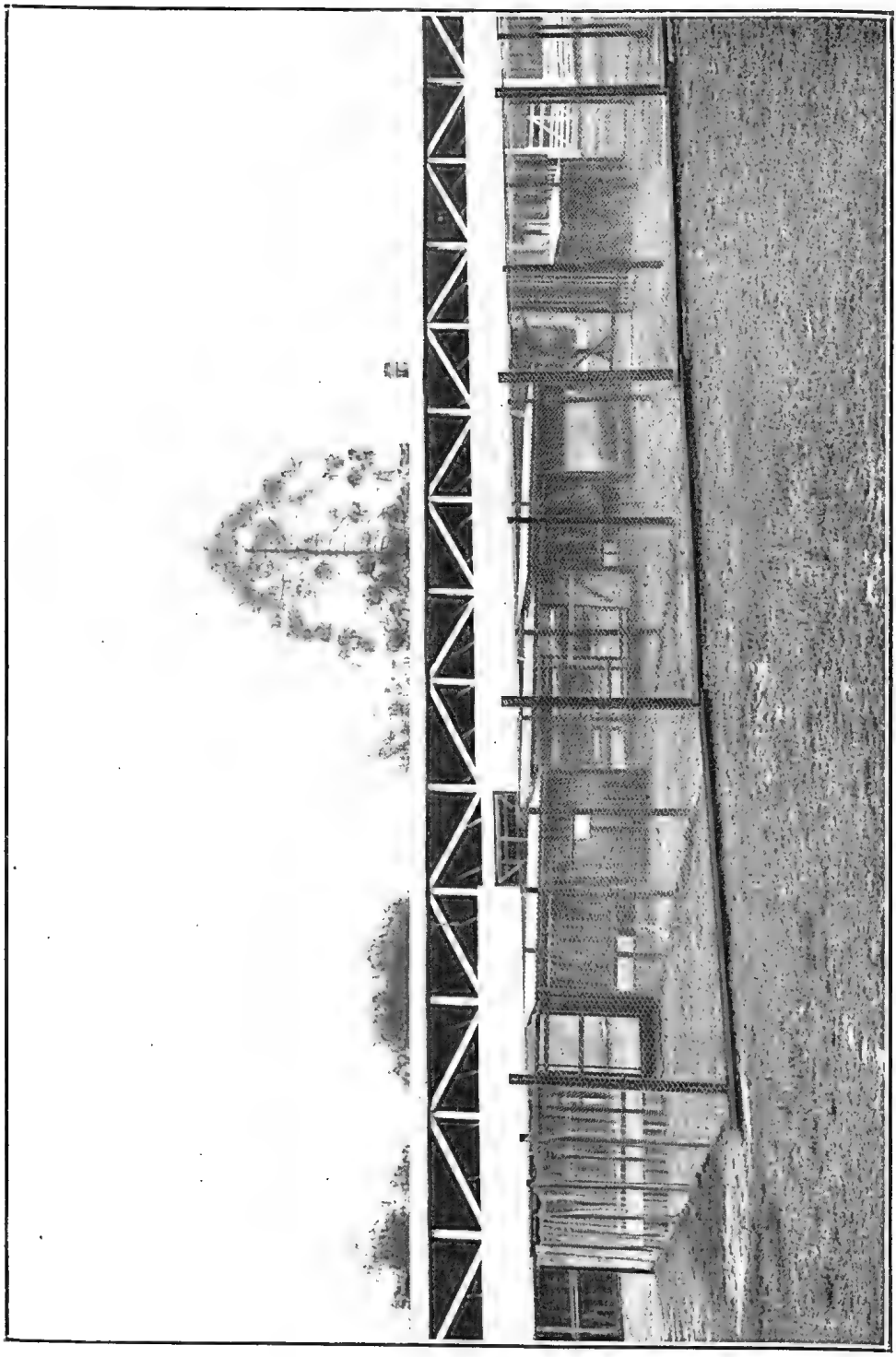


PLATE 24.—GENERAL VIEW OF EXHIBITION POULTRY PENS.

Plate 25.—Back View, showing a Completed House and Framing Walled with Roofing Felt.

blowing at the back of the buildings, the air is given an upward tendency, and as it passes from a comparatively narrow opening into the wider space of the building its rate of motion is slowed off and there is no down draught thrown on to the birds. On the other hand, if the wind comes from the front, it is blocked by the back in the lower part of the house, while the upper air is forced to curl downwards to escape through the vent. This downward curl prevents the lower air from moving upwards and tail-draughting the birds. (*See* Plate.)

One-half of the front is walled up with a 3-feet width of felt, and above this wire netting is used. The ends are closed in a manner similar to the back, except that the first batten is placed up 15 inches and the next 3 feet above this. By this means these end battens can be extended over the back and front battens, and are nailed on to the studs.

Having fixed the back and front walling, 2-inch and 1-inch fillets are nailed on the inside of each corner post to carry the end walling. It will be noted that the ends are not completely filled right up to the roof, nor is such filling necessary, except on the outer ends of the continuous building.

The roof plates are 3-inch by 1½-inch pine, halved into the studs. No rafters are used. If covered with corrugated iron the sheets are nailed directly on to the roof plates. If covered with roofing felt, board across from roof plate to roof plate and then lay the felt longitudinally with an overlap of 2 inches at the joint.

If any other flexible material, such as tarred or oiled hessian, is used for walling, a similar framework should be used, as later the more permanent roofing felt can be easily attached.

Where sawn palings can be secured at a reasonable cost, a good walling can be made of them, and their use will dispense with the 8-inch by 1-inch pine boarding, except at the doorway, the opening in front, and at the nest-box opening. When using the palings, set the first layer with spaces between them of 2 inches or more, depending on the width of the palings. Set the second layer so as to cover the gaps, allowing an inch overlap on each side. (*See* Plate.)

The dropping board is 8 feet by 2 feet, and rests on the lower batten at the back, and is supported at the end wall by a vertical batten (*see* fig. 4), while the outer end rests on an angle bracket, thus leaving the floor quite free for cleaning.

The door is made of T. and G. pine, and opens inwards. The roosts are made of 3-inch by 1-inch hardwood, attached to hardwood blocks at each end. These blocks should be small enough to allow the end of the perch, block and all, to be inserted into a kerosene tin for disinfecting purposes. The roost merely rests on the dropping board; it is not attached.

The nest-box is external, and consists of a long box 14 inches wide at bottom, 14 inches deep at back, and 16 inches deep at front. The ends of 1-inch pine, the top, back, and bottom of ½-inch timber. The ends are cut so as to allow the top to extend inside the building while the bottom rests against the pine boarding. The arrangement for the covering is shown in fig. 6, the hinged part having an

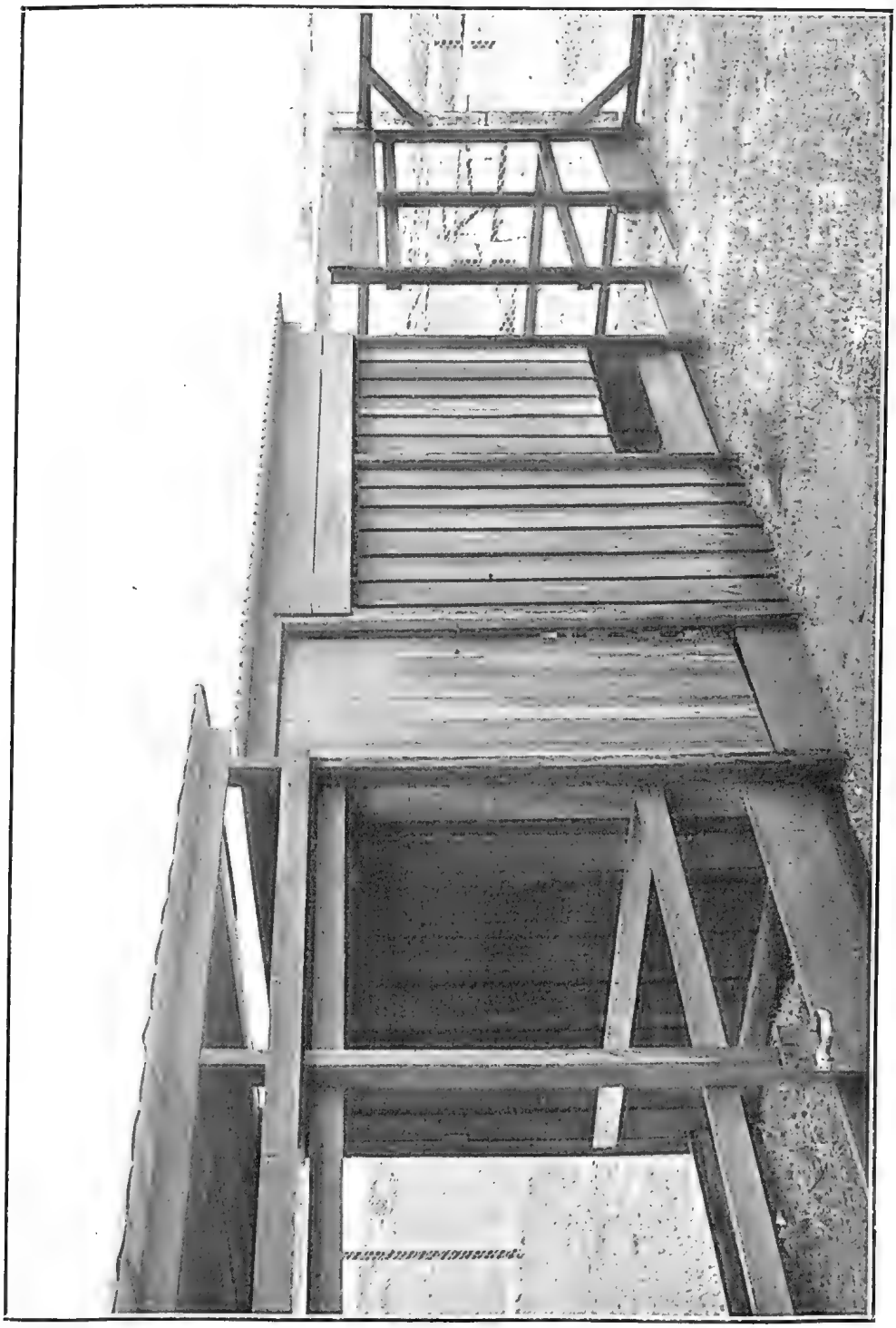


Plate 26.—Back View, showing Completed House and Framing Walled with Sawn Palings.

underlay of 1½ inches, so that, when closed, it forms a waterproof lid. Along the inner edge of the fixed part of the top is a 2-inch by 1-inch fillet which hooks under the pine batten when the nest-box is in position.

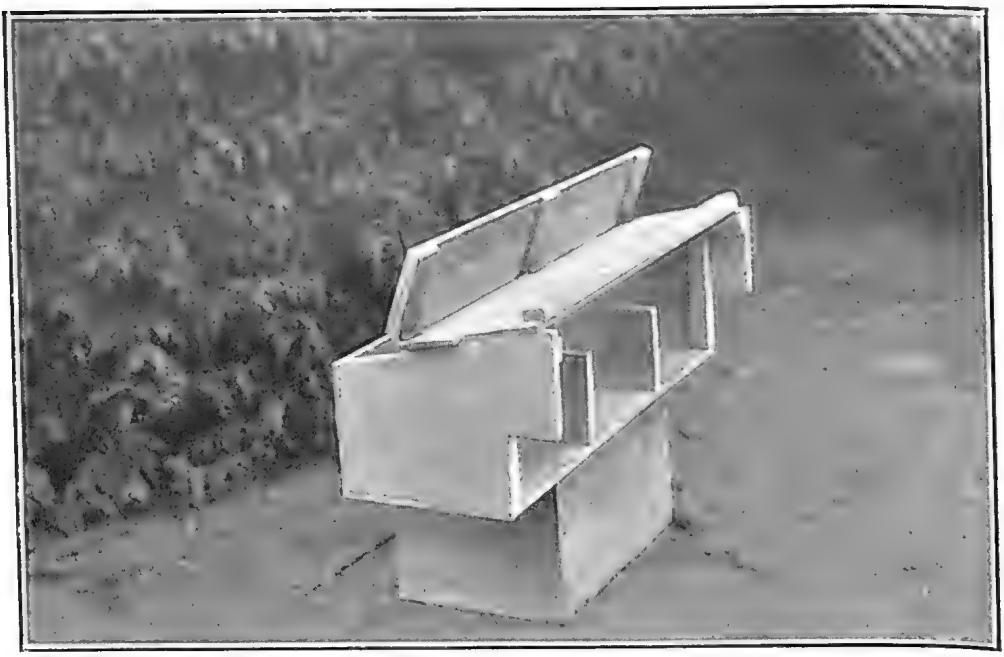


Plate 27.—Detachable External Nest Box.

On the pine boarding, and so as to allow the nest-box to rest on it, there is another 2-inch by 1-inch fillet. To remove the nest-box, lift the outer edge and the box will drop out.

Fences.

For the fencing of the yards, corner posts of 3-inch by 3-inch hardwood are used. For intermediate posts 3-inch by 1-inch hardwood set on edge to the wire are used. They are sunk 18 inches in the ground and have nailed on to the bottom portion a short length of 3-inch by 1-inch hardwood about 2 feet long, so as to make that portion in the ground 3 inches by 2 inches. The posts are set about 12 feet apart. All along the bottom, and half sunk into the ground, is nailed a 3-inch by 1-inch batten. Where joins have to be made, drive in a 3-inch by 1-inch stake to nail on to. Note, there are no struts used for the corner posts, nor any top straining wire. To attach the wire-netting, roll out the length, attach the shorter edge (one edge is always shorter than the other) to the tops of the posts, pulling as tight as you can by hand. Next, starting from the centre post of the fence, stretch the wire down well and nail to the batten at the bottom of the post. Treat each post similarly, working out towards the ends. Next pull the wire down fairly firmly in the centre of each panel, and nail to the bottom batten, then half-way between centre and each post, and again in half intervals. When the bottom is completed nail down each corner post; then, with a

piece of 3-inch by 1-inch catch each successive mesh along the top, and push upwards so as to straighten the top line. If too much strain has been exerted in pulling down on to the batten in the centre of the panels, this may be somewhat difficult. After the above has been completed the wire should lie fairly evenly, but if there are bulges, even big bulges, they can be removed as follows:—Take a piece of hardwood about 6 inches long and 1 inch square. Cut across one end a coarse sawcut about ½-inch deep. Use this as follows:—Slip the sawcut over the double wire between meshes, and then turn smartly. This makes a kink which will take up the slack. Where a bulge occurs, start somewhat above it working vertically down through its centre to some little distance below the bulge. Start with a light twist, increasing as you come into the bulge itself, and get gradually lighter as you finish. If properly carried out, the above gives a well-laid netting fence which, because of even tension, supports itself. There are no struts to assist birds in climbing over, while the absence of a visible top wire prevents a bird from attempting to fly. The yards are shown as 37 feet long, allowing four dividing fences to be cut from a 50-yards roll of wire netting. (*See* Plate.)

Combined Broody and Cockerel Coop.

Plate 28 shows a combined broody and cockerel coop. The uprights are 2 inches by 2 inches, and the general framework consists of 2-inch by 1-inch timber, the sides, back, and roof being made of ½-inch pine. The floor is about 2 feet off the ground, and the coop is 2 feet deep, 2 feet 6 inches high in front, and 4 feet wide. The picture shows the construction of the doors, the lower parts of which are slotted so as to allow of

Plate 28.—Combined Broody and Cockerel Coop.

feeding from the trough (shown on the ground), which fits into the V-shaped bearers at the ends. The slotted portion can, however, be closed by means of a board held in position by battens. The floor can be made either slatted or solid by altering the position of the false bottoms A and B which slide into position. A dividing door (C) is shown, which allows a cockerel to be kept in one half with solid floor and door slats covered and a broody hen in the other half, with slatted floor and uncovered slats in the door to enable her to feed from the outside trough. Note, the trough is so placed that it does not interfere with the swing of the doors.

To the right of the broody coop is shown a *swinging wet mash hopper* which could readily be placed in the back wall of a poultry-house. It consists of a V-shaped trough hinged on to the building along its bottom line. The picture shows the trough swung out ready for filling or cleaning as the case may be.

Plate 29 shows a safety hen and chicken coop. It consists of a box 2 feet by 2 feet square, 2 feet high in front, and somewhat less behind. Near the top of both back and front there is an opening covered with wire gauze. The top is loose and is shown leaning against the side. The box is loose on the bottom flooring. The door in front is double, the inner portion is framed round with 2-inch by 1-inch, and covered

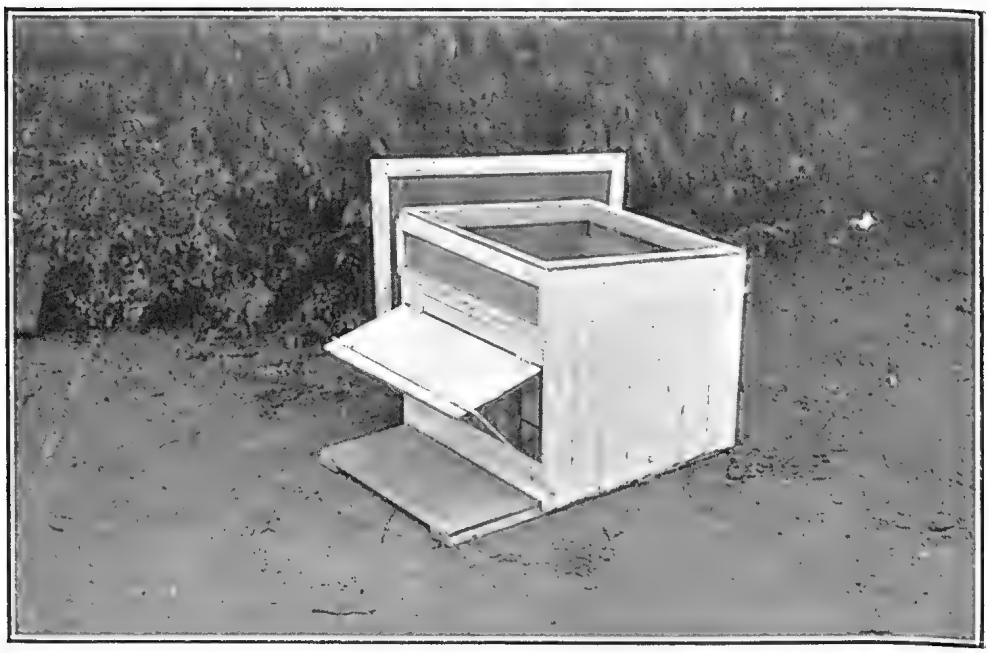


Plate 29.—Safety Hen and Chicken Coop.

with slats, hinged from the bottom and kept in position by a button at the top. The outer portion consists of a board to cover the slats. This is hinged to the upper framing of the inner door. An iron rod, bent as shown in the picture, passes through eyelets on the face of this board

and ends in hooks which fit into eyelets screwed into the side of the box. A second eyelet is shown further back, to hook into when the door is closed.

By this arrangement the hen can be kept in the coop, the chickens running free. The raised door acts as shade for the food. At night all can be closed up, and by lifting the lid and brushing out mosquitoes the coop becomes practically pest proof. As the coop is loose from the bottom, it can be raised slightly and the hen walked along till the floor is uncovered, when it can be readily cleaned, placed on fresh soil, and the coop and hen replaced on it.

Plate 30.—A Simple Heated Brooder.

Plate 30 shows a simple brooder using an ordinary hurricane lantern as a source of heat. It consists of a box 3 feet to 3 feet 6 inches square on the base, 2 feet high in front, and 18 inches high at the back, the whole standing on legs about 6 inches long. In the front there is an opening to lead out into a wire-covered run. The top is hinged on the front. Inside there is a cylinder of wirenetting surrounded by felt sheeting. This is large enough in the circle to hold a hurricane lamp, allowing about 2 inches to spare all round. The cylinder is about 8 inches high. Resting on fillets on the sides is a false top with a hole cut in its centre of somewhat less diameter than the circle of the cylinder described above, but large enough to allow the hurricane lamp to pass through.

This false top should lie about 1 inch above the wire cylinder and below the top of the lamp glass, thus letting the lamp fumes deliver above the boarding. Three-quarter-inch auger holes are bored through the sides and front to carry off the burnt air.

Viticulture.

REPATRIATION AND THE WEST.

By C. A. GATTINO.

In my notes on "Viticulture and Wine Industry after the War," which appeared in the May issue of the "Queensland Agricultural Journal," I stated that, with the protection of the Government, the returned soldiers would find greater attraction and more glorious promise in the future of a vineyard than in anything else.

In the West, especially where immense areas of dry calcareous loam soil are not utilised and are uncultivated, and where the irregular and unreliable rainfall prevents the progress of intense culture of other crops, the grape culture is the most adapted for such districts.

The men who are willing to settle on the land when they return home are generally looking for land in the neighbourhood of the locality in which their relatives and friends reside. Many thousands of our best lads, who have so willingly gone abroad to defend this fair land, belong to these Western districts, and it is only fair that the requirements of those brave returned soldiers should be satisfied by providing the best possible conditions and attractions for adequately settling them upon the nearest land from where they originally came.

I can firmly state that in these Western districts grape culture is the most appropriate, the most advantageous and attractive cultivation for small holdings, and for our returned soldiers; but what should we provide to assure the success and prosperity of such a great agricultural pursuit?

Above all, the help of the Government, by establishing a Western soldiers' group settlement formed for that culture, is essential.

By doing this, the Government would be able to offer returned soldiers the most reliable inducements, with the cheapest and most efficient organisation and instruction.

The settlers also will be benefited, because, having small pieces of suitable land in the same group, they can easily assist each other in ploughing, subsoiling, combating diseases, pruning, harvesting, &c.; they can also join together and build a large cellar in common, form an association, co-operative stores, &c.

The Government, however, will have to assure:—

1. That an expert Government viticulturist will give practical and active assistance so as to make grapegrowing as easy and profitable as possible, and teach them how to make good, natural, hygienic wine.
2. That grafted phylloxera resistant vines be supplied to them at special rates and conditions.

3. That the formation of a co-operative winery (as per my articles which appeared in the September, October, and November, 1916, issues of the "Queensland Agricultural Journal") will be subsidised, or a State winery established.

4. That the wine industry will be protected by adequate laws, facilitating the development of the local production and the consumption of wine.

These few inducements will assure the formation of such soldiers' group settlements, and the vine culture, which is a neglected agricultural pursuit in this State, will flourish and bring new wealth to the country.

As I said before, there is no other culture better suited for closer settlement.

Vine culture gives more freedom than any other in the light work that it involves, and it is unequalled for its constant and remunerative returns in comparison with the small capital that it requires.

Winegrowing employs more labour per acre than any other form of agriculture, and is a primary industry which should be of national importance in a country like this, so eminently suited for the industry.

Besides the labour involved in grapegrowing, other forms of labour and wealth are attached to every consequent branch of the wine industry.

Therefore, the industry is of economic and national importance, and must be well considered by our politicians in the framing of their post-war policies for employing the hundreds of thousands of men who will be returning home without affecting or endangering the labour market of Australia.

The fact, also, that our Australian troops now in Europe are daily enjoying their glass of light wine; recognising it as the most wholesome and purest of all stimulating drinks; observing the sobriety of the countries so eminently wine producers and drinkers; admiring how arid rocks and plains were converted into such beautiful smiling vineyards, with up-to-date cellars and distilleries, through which industry millions of people find peaceful and light work, will necessarily create in those brave soldiers the ambition to follow their mates of the allied countries in their wholesome and sober drinking habits, and induce them to make every effort to bring the viticultural industry of Australia to a prominent rank in similar industries of the world.

Certainly we must not mix up this agricultural pursuit with the liquor question. They are two different things altogether; I contend, rather, that the progress of the viticultural industry would lead to the automatic solution of the liquor problem—"The wine chases out the alcohol," and once the winegrowers become the proprietors of one of

the prominent cultures of the country and be well organised, with power to consolidate their political privileges, they would necessarily force the introduction of adequate laws for controlling and moderating the alcohol traffic.

By encouraging the proper handling and the progress of the wine industry, the consumption of wine must increase, drunkenness caused by alcohol be minimised, and temperance promoted.

The Wine Growers' Association are practically the real temperance societies, the actual temperance party of this country having fanatically jumped into the prohibitionist stage.

Pure light wine I consider the best temperance agent; but as long as the production of wine, for lack of Government encouragement, remains a neglected industry, so long will alcohol continue to be the triumphant beverage. There is no hope of accomplishing a thorough reform, for human nature has proved that it needs a stimulant.

By a practical scheme, which can be easily elaborated on the principles abovementioned, the Government could already make a start by establishing one of these grape group settlements in the Maranoa District, where millions of acres, near railway lines, are well adapted for settlement of that kind.

I conclude with the hope that our brave soldiers, when they return home, will be the triumphant saviours of this rich but throttled agricultural industry, as they were triumphant in the powerfully obstructed landing at Gallipoli.

HINTS TO GRAPEGROWERS.

Location.—The location of a vineyard, the choice of soil and the variety of grapes to be grown on it, have great influence on the productivity of the vines.

The vine grows best on hillsides, or possibly self-draining grounds, in localities sheltered from cold winds, not subject to late frosts or to heavy rainfalls during the gathering of grapes.

Soil.—A dry, calcareous loam soil is the most suitable for vines. Soils without any lime are not adapted to this cultivation unless you fertilise them with agricultural lime. Potash and iron are also very good soil qualities. The soil destined to this culture must not hold the moisture and should be at least 3 feet deep.

Planting.—Having chosen an appropriate location for the vineyard, and the variety of vines to plant, shall we choose cuttings or rooted plants?

Opinions on this subject are varied. There are those who prefer the rooted plants, because they are already provided with roots and are able in the first year to develop quicker and have the advantage of gaining one year's vegetation during the period of the first three years. Others, on the other hand, condemn the rooted plants, saying that being used to a certain soil they will suffer by replanting and bringing them into another soil, and never become strong, healthy plants; the cuttings instead, on the contrary, forming roots in the same soil where they grow, will get used from the beginning to the conditions of the same soil and climate.

For myself, I prefer the rooted plants, provided, however, that you can get them one year old and possibly grown in a similar soil to that of your vineyard. In case you should be compelled to use cuttings, get only strong, sound, and uniform ones; of short jointed wood, with well fed eyes, and with the stem smooth and firm without any spot produced by disease.

The method of planting grapes varies according to the soil, and the distance between the plants also varies according to the cultivation and training methods to follow.

If the vines are trained so as to form the head about a foot above the ground, situated in arid dry soil, and are to be cultivated with the hoe only, you can plant them from 3 to 4 feet apart each way. In training them for high cultivation, the distance between each plant should be greater. There is no plant like the grape which in variety or form of training and cultivation is so dependent upon climate, soil, and location; therefore the width of the rows would vary according to the aforesaid circumstances. The ground will have to be kept free of weeds, and it is left to the grower to do this work in the most economical and appropriate way. If the location of the ground allows of it, and you want to cultivate the vineyard by ploughing between the rows and hoeing around the vines, then the width of the rows should not be less than 7 feet, and in this case, you can plant the vines in the rows less than 3 feet apart. For planting rooted plants, dig holes of about 18 inches in depth, at the bottom of w hich place a very fine mixture of earth and manure. After having shortened the roots and tops of the plant, lay it in the hole above the aforesaid manure mellowed earth, spread out its roots evenly and vertically, then fill in the hole with earth, taking care that the soil immediately above the roots be well pulverised. The upper bud is, of course, left above the ground. In planting cuttings you can practice the same system as for rooted plants, or plant them by making a hole in the cultivated ground with a crowbar, and putting the cutting in, making the earth well adherent to it. If while planting you fear a drought, it is advisable to water the hole and the cutting. It is also a good practice for very compact soils to put sand or sawdust in the holes where you have to plant the cuttings. The rooted plants or the cuttings must not be planted too deep—18 inches is deep enough. In laying the cuttings too deep you would prevent the formation of an ample roots system.

(To be continued.)

Botany.

PLANTS POISONOUS TO STOCK.

By C. T. WHITE, Acting Government Botanist.

TAPE VINE (STEPHANIA HERNANDIAEFOLIA, *WALP.*).

The list of plants in Australia reputed poisonous or harmful to stock is a fairly lengthy one. In very few cases, however, have we any definite information about the particular plants (suspected), there being a great lack of knowledge on this most important matter. There are two methods of gaining more accurate information on the subject; the one by the experimental feeding of animals upon the suspected plant and the other by the establishment by chemical analysis of the presence therein of definite poisonous principles.

At various times specimens of the vine *Stephania hernandiæfolia* (Tape Vine) have been sent in for identification as being suspected of causing losses amongst stock.

In December, 1912, Mr. J. L. Bowman, Stock Inspector, Booningba, wrote to the Department "I am forwarding a small parcel of vines gathered on Tallebudgera Creek about the scene of the deaths of cattle which have taken place during November and December for several years past; several local residents believe this vine to be poisonous, and say that cattle eat it freely at times."

In February, 1916, Mr. D. McKenzie, Beechmont, sent specimens with the remark "We had four goats and four young poddies that died apparently from poison; they were feeding in the paddock in which these plants grow."

Poisonous Properties.

Dr. T. L. Bancroft (Proc. Linn. Soc. N.S.W., vol. IV., n.s. p. 1063, 1889) found the roots to contain an exceedingly poisonous alkaloid. Rennie and Turner (Trans. Roy. Soc., Sth. Aus., vol. 17, p. 186, 1893, and Report A.A.A.S., 1895, p. 277) separated and identified *picrotoxin* as one of the constituents of the plant, and stated that there was at least one alkaloid in addition, as reported by Dr. Bancroft. Dr. J. Shirley (Proc. Roy. Soc. Q., vol. XI., p. 88, 1896) records the use of *Stephania hernandiæfolia* as a fish poison among the aborigines of the Nerang and Mudgeraba districts; he states "A well-known waterhole or rockpool, noted as a good haunt for fish, is selected and the bruised stem (cut up into about 2 ft. lengths) is scattered about in the water of the pool, the fish float on the surface of the water and soon find their way into the dilly-bags of the operators." Harris and Smith, in their paper "Fish Poisons of the Queensland Aborigines" (Mem. Queens. Mus., vol. V., p. 8, 1916), working on the whole plant state: "Separation of the alkaloid and of a supposed picrotoxin fraction showed the former to be rather slowly toxic at a concentration of 1:50,000; with the latter no physiological effect was observed. The alkaloid is probably the chief active constituent of the poison."

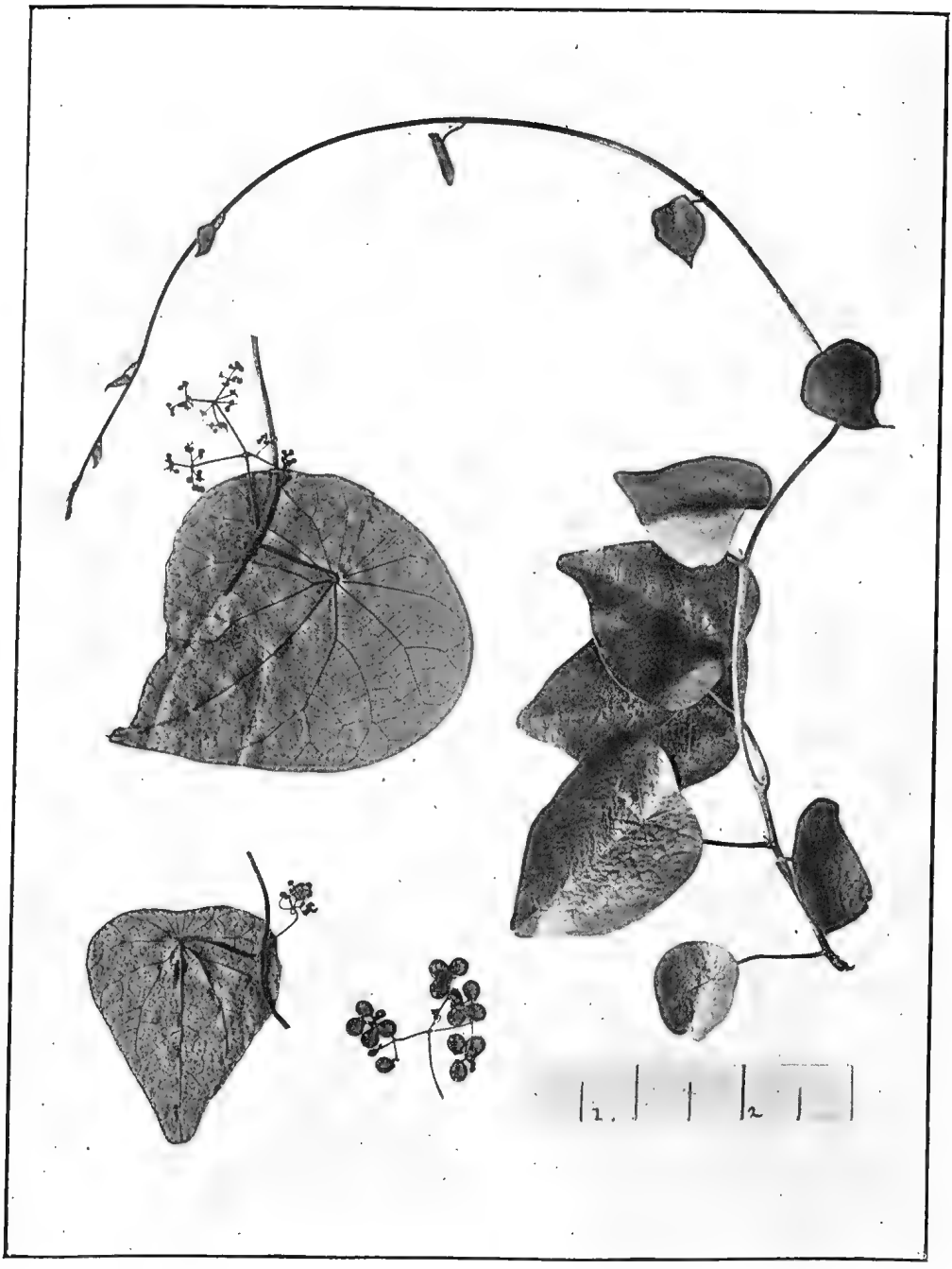


Plate 31.—Tape Vine (Stephania Hernandiaefolia).

BRIEF DESCRIPTION.

A climber. Leaves broadly ovate, orbicular or nearly triangular, usually more or less peltate. Flowers in umbels in the axils of the leaves, the common peduncle bearing about five rays, each ray terminated by a head of 8-12 minute flowers. Drupe compressed, orange-red, epicarp succulent, endocarp bony and transversely tuberculate.

DISTRIBUTION.

Common in the coastal country throughout Queensland; also found in New South Wales and Victoria; it extends beyond Australia, being found in tropical Asia and tropical Africa.

MAPLETON STATE SCHOOL.

By the courtesy of the Under Secretary for Education we have received the following letter addressed to him by Mr. F. E. Watt, head teacher of the Mapleton State School, giving an account of an educational visit to the school by the pupils of the Nambour Rural and Yandina Schools on the 10th August last:—

"On Friday, 10th August, a party of eighty pupils from the Nambour Rural School and Yandina School visited this school for the purpose of observing the agricultural work of the school plot, and taking part in the planting of a number of citrus trees in the new portion of the plot.

Mr. T. G. Fisher was in charge, and other teachers present were Messrs. J. Lane, J. T. Wilson, T. E. Martin, and F. M. Barton.

On arrival at Mapleton, about 11.45, the pupils marched to the school. Here I gave them a brief outline of the work to be undertaken, explaining the methods to be adopted and objects aimed at. I showed them scale pests at various stages and drew their attention to several interesting features of the school plot. After lunch the children were divided into groups, which were taken charge of by members of the school committee, Messrs. W. J. Smith, J. R. Morris, and W. Collins, experienced and successful fruitgrowers, who had kindly attended to assist in planting operations. After a demonstration of deep-planting by Mr. Smith, the squads set to work and in a little more than an hour, under the careful supervision of the abovenamed gentlemen, the children had planted a small orchard of twenty-four trees. The majority of them took a keen interest in the work and seemed quite delighted to be allowed to carry out the practical part of the work.

On completion of planting, the pupils marched to the orchard of Mr. W. J. Smith to witness pruning operations on the Maltese system. An expert pruner was at work, and he gave an exhibition of pruning for the benefit of the children. The party left Mapleton at 3.30 and arrived at Nambour about 4.45.

The trees were donated to the school by Messrs. Ferguson and Son, through their agent, Mr. Droney, of Woombye, and appear to be a healthy, vigorous lot. Of the total number, twelve are Washington Navels, on which variety it is proposed to try methods of (1) deep cultivation, (2) cincturing, (3) irrigation, in an attempt to solve the problem of the irregular cropping of this variety.

General Notes.

REGISTRATION BY THE POSTMASTER-GENERAL OF LABORATORIES.

The Department of Agriculture and Stock has received from the Deputy Postmaster-General of the Commonwealth of Australia, notice to the effect that, as it is understood that the Department's Stock Experimental Station at Yeerongpilly may be sending or receiving pathological or bacteriological specimens by post for laboratory diagnosis, a form for completion with the view of the laboratory in question being registered in pursuance of the Postal Regulations has been supplied to the department:—

(2) Regulations 46 and 76.

46 (*a*) Pathological specimens addressed to laboratories registered by the Postmaster-General may be accepted for transmission by registered package post under the following conditions, viz.:—

(*b*) The liquid or substance forwarded for examination must be enclosed in a receptacle hermetically sealed, which receptacle must itself be placed in a strong wooden or metal case in such a way that it cannot shift about, and with a sufficient quantity of some absorbent material (such as sawdust or cotton wool) so packed about the receptacle as absolutely to prevent any possible leakage from the packet in the event of damage to the receptacle.

(*c*) The packet must on no account be dropped into a letter box or be sent by parcel post. Any packet of the kind, whether registered or not, found in the post, not packed as directed, shall be deemed to be posted in contravention of the "Post and Telegraph Act, 1901-1913," and dealt with accordingly.

(3) Any person who sends by post pathological specimens, otherwise than as provided by these Regulations, shall be liable to a penalty not exceeding £50.

(4) A packet containing any pathological specimens shall not be accepted for transmission, or, if found in the post, shall not be delivered unless addressed to a laboratory which has been registered by the Postmaster-General in accordance with these Regulations.

76. Pathological specimens addressed to the General Superintendent, Imperial Cancer Research Fund, London, and sent by registered medical or veterinary practitioners, or by recognised pathological or related scientific laboratories, may, if securely packed in tubes enclosed in wooden cases, be forwarded by sample post.

UTILISING COTTON IN THE HOME.

We have received from Mrs. H. C. P. Crees, of Ayr, two pretty samples of crochet work with Queensland cotton, grown, spun, and worked up as here shown, by Mrs. Crees. The spinning of the cotton does not present any more difficulty than spinning wool, and the resulting yarn can be utilised for many domestic and artistic articles.

TANNING KANGAROO SKINS.

Hair may be removed from skins before tanning by soaking in lime water for several days, or the skins may be folded together, when fresh, and kept warm, so that they will begin to putrefy. Each of these processes will loosen the hair, which may then be scraped off with a knife. All skins may be treated in the same manner. In actual tanning with wattle or other bark, various strengths are used, beginning with a weak solution of the bark and finishing up with a saturated solution, in which chopped bark is often packed between the layers of skins as they are placed in the final pit or tub. Strengths are gauged not by the amount of bark used, as the tanning content varies greatly in different samples of the same variety, but by testing the specific gravity of the solution.

THREE HUNDRED AND SIX CENTURIES LOST BY STRIKES.

In nine months we lost 306 centuries through strikes in one State. So appalling are the figures that one might doubt their accuracy if they came from a source less reliable than the State Industrial Commission of New York. The report gives the details of this enormous waste.

During the period from October 1, 1915, to June 30, 1916, there were 328 strikes reported, involving directly 222,325 persons who lost 8,144,438 days and indirectly 31,629 persons were thrown out of employment for 1,466,725 days, making a total of 9,581,163 days' lost time.

This is a most striking proof that we deserve the title of Industrial Wasters of the World. The responsibility for this loss is not easily placed; a strike too often is the result of a combination of circumstances. But if, when a strike seems imminent, both employer and labourers would consider the total loss to our nation, we might be able to save a few centuries, and thus preserve our most valuable commodity—time.—"American Industries."

[And a still more valuable commodity—the hearths and homes of the strikers' families.—ED. "Q.A.J."]

SOCIETIES, SHOW DATES, ETC.

Coorparoo.—Coorparoo Progress, Horticultural, and Industrial Association. Show date: 31st August, 1918. W. D. Dell, secretary.

Malanda.—Eacham P.A. and I. Society. The show was postponed from 29th and 30th August to 26th and 27th September.

Innisfail.—Johnstone River Agricultural Society. Show date: 21st and 22nd September. T. Nisbet, secretary.

Woodford.—Woodford District Fruit Growers' Association. H. Cameron Cowie, secretary.

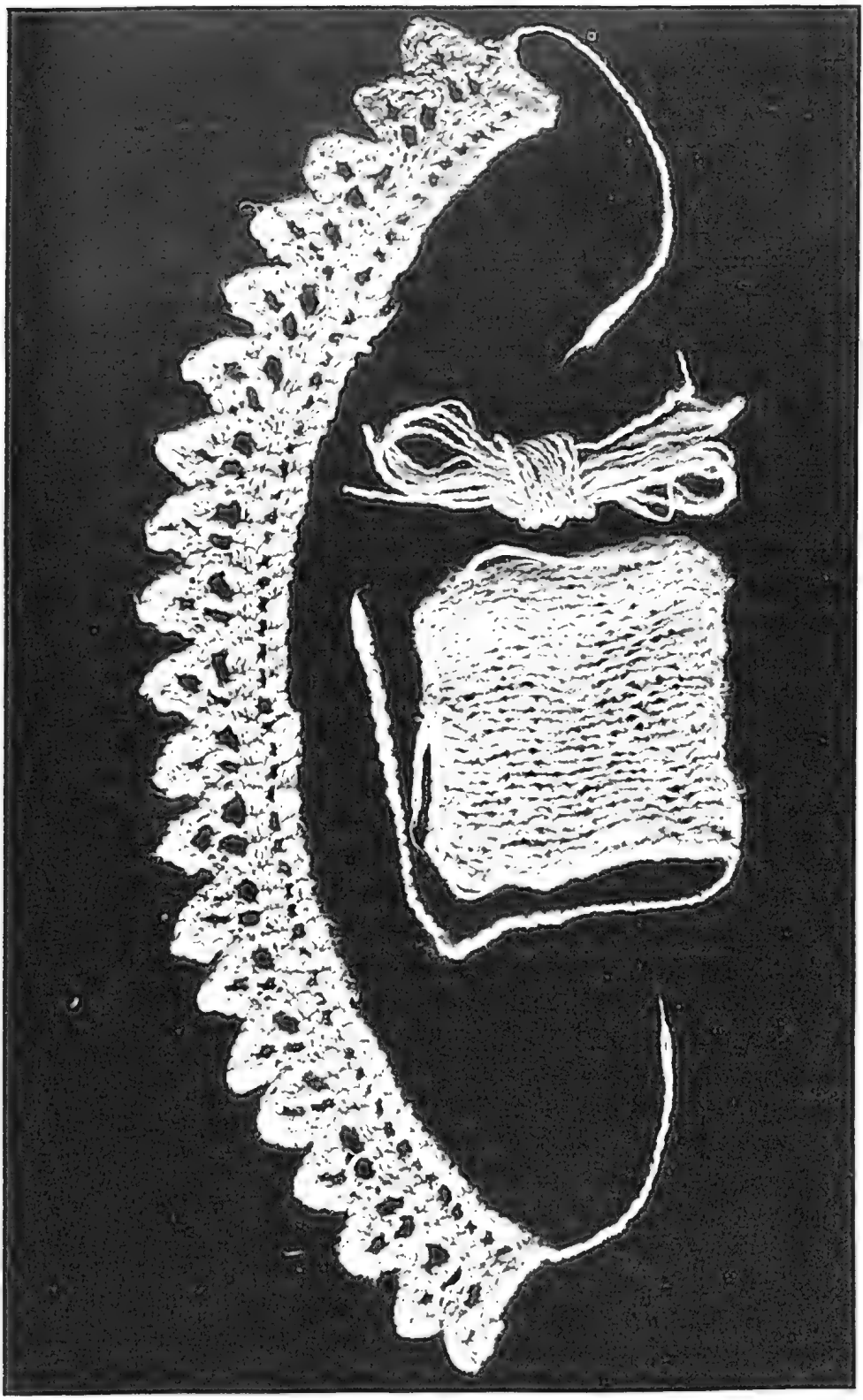


Plate 32.—Crochet Work on the Farm, from Home-grown Cotton.

Answers to Correspondents.

GOPHERS.

"Farmer"—

Gophers are always mentioned in American agricultural journals, as they are very important enemies of agriculture. The ground squirrel usually is called a gopher, although the term should be reserved for an entirely different family of mammals—the pocket gophers. Five species of the ground squirrel are found in the valley of the Mississippi River and its tributaries, and everywhere they are recognised as a pest of agriculture on account of their habit of feeding on pasture grasses and grain, of which latter crops they consume vast quantities. They also do much damage (as do moles in Europe) on account of the large mounds they throw up in digging their burrows. Their flesh, like that of our Australian bandicoot, is tender and of a delicate flavour. They are usually destroyed by the use of carbon bisulphide.

THE QUEENSLAND GIANT RAT.

Mr. A. M. MacDiarmid, Crow's Nest, writes:—"I have just read in the "Queensland Agricultural Journal" your notes on "The Queensland Giant Rat" which Mr. H. A. Longman states is found in North-eastern Australia. I thought that you would be interested to know that a specimen of the same species of rat was found here a few weeks ago. It was found amongst a quantity of firewood that had been cut into blocks and had been stacked up for some months. The men that found it did not know what it was and brought it into town alive. The writer very quickly found it had teeth, as when he was examining it, the rat bit him right through the finger. Needless to say the rat did not stay alive very long. It is the first of the kind ever caught here to the writer's knowledge. Your notes upon the matter have now cleared the mystery up, as no one knew what it was before."

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR SEPTEMBER, 1917.

Article.		SEPTEMBER. Prices.
Bacon	lb.	9½d. to 10d.
Barley	bush.	2s. to 5s. 6d.
Barley (Local)	„	1s. 6d. to 2s. 2d.
Bran	ton	£5 15s.
Broom Millet	„	£18 to £25
Butter (1st Grade)	cwt.	158s. 8d.
Chaff, Mixed	ton	£5 12s.
Chaff, Oaten	„	£5 10s. to £5 15s.
Chaff, Lucerne	„	£3 10s. to £7 10s.
Chaff, Wheaten	„	£1 10s. to £3 15s.
Cheese	lb.	9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£6 15s. to £7 15s.
Hay, Lucerne	„	£4 15s. to £5
Honey	lb.	3½d. to 4d.
Maize	bush.	2s. 6½d. to 2s. 9½d.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£12 to £14
Peanuts	lb.	3½d. to 4d.
Pollard	ton	£5 5s.
Potatoes	„	£6 15s. to £8
Potatoes (Sweet)	sug. bag	1s. 6d. to 2s.
Pumpkins (Cattle)	ton	£2 10s. to £2 12s.
Eggs	doz.	9½d. to 10½d.
Fowls	per pair	4s. to 6s. 6d.
Ducks, English	„	3s. 6d. to 4s.
Ducks, Muscovy	„	4s. to 6s. 9d.
Ducks, Wild	„	3s. 6d.
Geese	„	7s. to 8s.
Turkeys (Hens)	„	9s. 9d. to 13s. 4d.
Turkeys (Gobblers)	„	14s. to 18s. 6d.
Wheat (Milling)	bush.	2s. 6d. to 3s.
Hares (Alive)	pair	15s.
Hares (Dead)	„	5s.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	4s. to 7s.
Cauliflowers, per dozen	7s. to 10s.
Celery, per bundle	...
Beans, per sugar bag	8s. to 12s.
Peas, per sugar bag	9s. to 12s.
Carrots, per dozen bunches	1s. 3d. to 1s. 9d.
Chocos, per quarter-case	...
Beetroot, per dozen bunches	1s. to 1s. 3d.
Lettuce, per dozen	1s. to 2s.
Marrows, per sack	3s. to 4s.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per sugar bag	1s. 6d. to 2s.
Table Pumpkins, per dozen	4s. to 5s.
Tomatoes, per quarter-case	4s. to 7s.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	SEPTEMBER. Prices.
Bananas (Queensland), per case	8s. to 11s.
Bananas (Tweed River), per case	...
Bananas (Fiji), per case	18s. to 20s.
Bananas (G.M.), per bunch	...
Bananas (G.M.), per case	...
Guavas, per case	...
Lemons (Local), per bushel-case	2s. to 4s. 6d.
Mandarins, per case	2s. to 6s.
Oranges (Navel), per case	8s. to 12s.
Oranges (Queensland), per case	6s. to 10s.
Papaw Apples, per half-bushel-case	7s. to 10s.
Passion Fruit, per half-case	1s. 6d. to 6s.
Pineapples (Queens), per double-case	4s. 6d. to 7s.
Pineapples (Common), per double-case	4s. 6d. to 6s.
Tomatoes, half-bushel-case	3s. to 5s.
Strawberries (Queensland), per tray	4s. to 6s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	SEPTEMBER. Prices.
Apples, Eating, per case	12s.to 14s.
Apples, Cooking, per case	13s.
Bananas (Cavendish), per dozen	3d. to 4d.
Bananas (Sugar), per dozen	2d. to 3d.
Cape Gooseberries, per quarter-case	7s. to 10s.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. to 3s. 6d.
Custard Apples, per tray	4s. to 6s.
Lemons (Lisbon), per tray	6s. to 7s.
Limes, per tray	...
Mandarins, large, per tray	7s. to 9s.
Oranges (Navel), per case	9s. to 10s.
Oranges (Seville), per hundredweight	11s.
Oranges (other), per case	3s. 6d. to 4s.
Papaw Apples, per quarter-case	2s. to 5s.
Passion Fruit, per half-case	4s. to 6s.
Pears, per half-case	...
Peanuts, per lb.	3½d. to 4d.
Persimmons, per quarter-case	...
Pineapples (Ripleys), per dozen	6d. to 1s. 9d.
Pineapples (Rough), per dozen	6d. to 1s. 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Strawberries, per dozen boxes	6s. to 22s.
Tomatoes, per quarter-case	5s. to 8s.

TOP PRICES, ENOGGERA YARDS, AUGUST, 1917.

Animal.	AUGUST. Prices.
Bullocks	£25 15s. to £26 10s.
Bullocks (Single)	£29 5s.
Cows	£15 15s. to £18 5s.
Merino Wethers	46s. 9d.
Crossbred Wethers	48s. 9d.
Merino Ewes	34s. 6d.
Crossbred Ewes	40s. 9d.
Lambs	38s. 9d.
Pigs (Porkers)	63s.

EXHIBITION FAT STOCK SALES.

Animal.	AUGUST. Prices.
Bullocks	£23 to £29 15s.
Bullocks (Guessing)	£28
Bullocks (Champion)	£34 15s.
Bullocks (Heaviest Live Weight)	£35
Cows	£18 5s. to £22 10s.
Cows (Champion)	£25 10s.
Merino Wethers	51s.
Crossbred Wethers...	61s.
Crossbred Ewes	60s.
Lambs	43s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August, 1917, in the Agricultural Districts, together with Total Rainfalls during August, 1917 and 1916, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of Years' Records.	Aug., 1917.	Aug., 1916.		Aug.	No. of Years' Records.	Aug., 1917.	Aug., 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·87	15	1·70	0·66	Nambour	1·89	20	2·28	4·54
Cairns	1·85	34	2·78	1·64	Nanango	1·51	34	0·79	1·25
Cardwell	1·26	44	1·28	2·79	Rockhampton ...	0·92	29	3·41	2·03
Cooktown	1·46	40	0·79	0·93	Woodford	1·98	29	1·34	2·97
Herberton	0·64	29	1·44	0·79					
Ingham	1·34	24	1·73	2·36					
Innisfail	5·27	35	16·82	3·08					
Mossman	1·80	5	1·26	1·82	*Darling Downs.*				
Townsville	0·41	45	2·07	0·63					
					Dalby	1·26	46	1·05	2·01
					Emu Vale	1·25	20	0·68	1·96
Central Coast.					Jimbour	1·36	28	0·71	1·12
					Miles	1·30	31	0·78	1·33
Ayr	0·38	29	3·05	0·63	Stanthorpe ...	1·95	43	0·83	2·26
Bowen	0·63	45	3·05	0·92	Toowoomba ...	1·83	44	1·89	2·22
Charters Towers ...	0·37	34	2·03	1·91	Warwick	1·55	29	0·99	1·92
Mackay	0·98	45	4·58	0·85					
Proserpine	0·89	13	4·18	0·72					
St. Lawrence ...	0·89	45	1·78	1·17	*Maranoa.*				
					Roma	0·97	42	0·89	1·56
South Coast.									
					State Farms, &c.				
Biggenden	1·18	17	1·63	2·42					
Bundaberg	1·43	33	1·14	2·36					
Brisbane	2·25	66	1·03	1·73	Bungeworgorai ...	0·75	5	1·02	1·51
Childers	1·26	21	1·28	2·00	Gatton College ...	1·33	17	0·82	1·79
Crohamhurst ...	2·43	25	3·61	5·19	Gindie	0·66	17	3·27	1·06
Esk	1·70	29	0·78	1·53	Hermitage ...	1·53	10	0·82	2·13
Gayndah	1·26	45	0·85	2·04	Kairi	0·87	5	1·67	0·55
Gympie	1·89	46	1·75	3·88	Kamerunga ...	1·51	26	2·51	2·08
Glasshouse M'tains	1·62	8	2·04	3·14	Sugar Experiment Station, Mackay	0·77	19	3·96	1·30
Kilkivan	1·62	37	0·65	2·41	Warren	1·13	5	3·06	2·40
Maryborough ...	1·79	45	2·35	2·66					

Note.—The averages have been compiled from official data during the periods indicated; but the totals for August this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	September.		October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·2	5·34	5·29	5·47	4·59	6·5	4·46	6·28
2	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·0	5·35	5·27	5·48	4·58	6·7	4·46	6·29
4	5·59	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·58	5·36	5·25	5·49	4·57	6·8	4·46	6·31
6	5·57	5·36	5·24	5·50	4·56	6·9	4·46	6·32
7	5·55	5·36	5·23	5·50	4·55	6·9	4·46	6·32
8	5·54	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·53	5·37	5·20	5·51	4·54	6·11	4·47	6 33
10	5·52	5·38	5·19	5·52	4·53	6·11	4·47	6·34
11	5·51	5·38	5·18	5·52	4·52	6·12	4·47	6·34
12	5·50	5·39	5·17	5·53	4·52	6·13	4·47	6·35
13	5·49	5·39	5·16	5·53	4·51	6·14	4·47	6·35
14	5·48	5·40	5·15	5·54	4·51	6·15	4·48	6·36
15	5·47	5·40	5.14	5·54	4·50	6·16	4·48	6·36
16	5·45	5·41	5·13	5·55	4·50	6·17	4·48	6·37
17	5·44	5·41	5·12	5·55	4·49	6·18	4·48	6·38
18	5·43	5·42	5·11	5·56	4·49	6·19	4·49	6·39
19	5·42	5·42	5·10	5·56	4·48	6·19	4·49	6·40
20	5·41	5·42	5.9	5·57	4·48	6·20	4·50	6·40
21	5·40	5·43	5·8	5·57	4·47	6·21	4·50	6·41
22	5·39	5·43	5·7	5·58	4·47	6·22	4·51	6·42
23	5·37	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·36	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·35	5·45	5·4	6·0	4·47	6·24	4·52	6·43
26	5·34	5·45	5·3	6·0	4·46	6·24	4·53	6·43
27	5·33	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·32	5·46	5·2	6·1	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·2	4·46	6·26	4·55	6·44
30	5·30	5·47	5·0	6·3	4·46	6·27	4·56	6·45
31	...	...	5·0	6·4	4·46	...	4·57	6·45

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
1	Sept.	○ Full Moon	10	28	p.m.
8	,,	☽ Last Quarter	5	5	,,
16	,,	● New Moon	8	28	,,
24	,,	☾ First Quarter	3	41	,,

The Moon will be at its greatest distance from the earth at midnight on the 14th, and at its least distance on the night of the 30th.

1	Oct.	○ Full Moon	6	31	a.m.
8	,,	☽ Last Quarter	6	14	p.m.
16	,,	● New Moon	12	41	,,
24	,,	☾ First Quarter	12	38	a.m.
30	,,	○ Full Moon	4	19	p.m.

The moon will be furthest from the earth on the 12th, and nearest to it on the 28th.

7	Nov.	☽ Last Quarter	3	4	a.m.
15	,,	● New Moon	4	28	,,
22	,,	☾ First Quarter	8	29	,,
29	,,	○ Full Moon	4	41	,,

The Moon will be furthest from the earth on the 9th, and nearest to it on the 24th.

7	Dec.	☽ Last Quarter	12	14	a.m.
14	,,	● New Moon	7	17	p.m.
21	,,	☾ First Quarter	4	7	,,
28	,,	○ Full Moon	7	52	,,

The Moon will cause an *Annular Eclipse* of the *Sun* on December 14th, but it will not be visible in Queensland. On the 28th there will be a *Total Eclipse* of the *Moon* between 7.38 and 7.55 p.m. It will be partly eclipsed for an hour and a-half before and after totality.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November, may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for November.

Field.—Under ordinarily favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, cotton, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

Kitchen Garden.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c., and transplant for succession in calm, cloudy weather.

Flower Garden.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for November.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where the land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop, valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-custers should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oïdium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am

certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of the year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; for too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening the soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if fruit fly makes it appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to tree or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oïdium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oïdium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit fly in the early ripening fruits, and gather and destroy all that may be so affected.

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Pastoral.

TICKS.

THE "CASH VALUE" OF DIPPING OR SPRAYING CATTLE TO FREE THEM FROM TICKS. IMPORTANT OFFICIAL EVIDENCE OF IMMENSE GAINS SECURED AND ENORMOUS LOSSES AVOIDED BY FREEING CATTLE FROM TICKS.

In order to secure some direct evidence from stock-owners regarding the benefits derived from the tick-eradication work carried on in the Southern States of North America, a circular was sent out to a large number of representative cattle-owners by the Department of Agriculture, asking for replies to various specific questions concerning the results of the work. The questions are given below, with their summarised answers. These afford most impressive evidence, not only of enormous losses prevented but also of immense gains obtained by the dipping of animals to free them of ticks.

Question.—What were the approximate annual losses of cattle from tick-borne diseases before the tick-eradication work was started? Answer: 15·3 per cent.

Question.—What has been the annual loss of cattle from tick-borne diseases since tick eradication started? Answer: 1·3 per cent.

Note.—The answer to this question should be compared with that to the first question, when it will be seen that the tick-eradication work has resulted in the losses being reduced from 15·3 per cent., *i.e.*, practically to vanishing point.

Question.—What was the average value of three-year-old steers in your county before the tick-eradication work was started? Answer: 16 dollars 15 cents (£3 7s.).

Question.—What is the average value of three-year-old steers now? Answer: 25 dollars 28 cents (£5 5s.).

Note.—In comparing the replies to the two preceding questions, allowance has to be made for the recent general advance in the price of cattle. When this is done, the result shows that there still remains an appreciation in value of 40 per cent. which can be properly said to be due to the absence of ticks.

Question.—Is there any difference between the average weight of cattle now and the average weight before tick eradication was started? How much? Answer: Yes. Average increase, 22 per cent.; average weight increase, 116 lb.

Note.—Taking the value of the animals at 3½ cents (1¾d.) per lb. (the average for three-year-old steers), the average gain, due to dipping, works out at 4 dollars (16s. 8d.) per head.

The above figures prove beyond all doubt that the cost of freeing cattle from ticks is not an "expense," but an "investment," which brings in most excellent "interest" in the form of a greatly increased value of animals treated.—"Journal of the Jamaica Agricultural Society."

£10,600 FOR A BULL CALF.

There was a sale of Holsteins at Worcester, Mass. (U.S.A.), recently, to which our American exchanges devote much space. Almost-incredible bids were registered, and 143 head sold for £60,000, an average of nearly £420.

"Kimball's Dairy Farmer" says that world-record animals were in evidence all the time, and world-record prices were paid with such abandon as to make an ordinary mortal dizzy.

A five-months-old bull calf, King Ormsby Jane Rag Apple, whose sire is the great bull, Rag Apple Korndyke 8th, and whose dam is Ormsby Jane Segis Aaggie, with a butter record of 46·33 lb. in seven days, sold for £10,600, the highest price ever paid for a bull.

The four-year-old heifer Wandermeere Belle Hengerveld (42·61 lb. of butter in seven days as a four-year-old) sold for £3,650. Two years ago this heifer was bought for £125.

Another cow sold for £3,600—Glen Alex Queen De Kol, the world's record two-year-old, that made 42·35 lb. of butter in seven days.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	4	38	Ayrshire Herd Book of Queensland
		..	2	Ayrshire Herd Book of Scotland
		2	9	Holstein-Friesian Herd Book of Australia
		2	31	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Friesian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Friesian Herd Book of Queensland
		2	..	Holstein-Friesian Herd Book of Australia
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking.. ..	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book
H. M. Hart	Glen Heath Stud, Yalangur	7	21	Ayrshire Herd Book of Queensland
C. Behrendorff ..	Inavale Stud Farm, Boonah	3	9	Holstein-Friesian Herd Book of Queensland
F. A. Stimpson ..	Ayrshire Stud Farm, Fairfield, South Brisbane	17	68	Ayrshire Herd Book of Queensland

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1917.

The total number of eggs laid for the month was 9,505. Very changeable weather has been experienced, including heavy rains which caused some discomfort to the birds. Broodies have been troublesome amongst the heavy breeds. Mr. J. M. Manson's pen put up the highest score in the light breeds with 159, with E. Chester second with 152 eggs. In the heavy section, E. A. Smith leads with 151 and R. Burns and W. Smith tie for second place with 149 eggs. E. A. Smith and E. F. Dennis are equal, with 29 each, for highest individual score for the single-pen test. The Dixie Egg Plant's barren hen (F.) was removed and another bird substituted. The following are the individual records:—

Competitors.	Breed.	Sept.	Total.
	LIGHT BREEDS.		
E. Chester	White Leghorns ...	153	792
*G. H. Turner	Do.	142	705
G. Chester	Do.	145	679
W. Becker...	Do.	121	676
F. W. Leney	Do.	140	674
C. Porter	Do.	140	671
W. R. Crust	Do.	133	664
T. A. Pettigrove, Victoria	Do.	140	655
Moritz Bros., S.A.	Do.	134	648
Oakland Poultry Farm	Do.	133	647
*J. M. Manson	Do.	159	642
*J. Zahl	Do.	135	623
T. Taylor	Do.	124	621
Kelvin Poultry Farm	Do.	141	619
Quinn's Post Poultry Farm	Do.	148	618
*J. R. Wilson	Do.	126	612
J. G. Richter	Do.	134	607
*A. T. Coomber	Do.	130	600
T. B. Hawkins	Do.	113	600
A. Shillig	Do.	140	599
J. Fulton	Do.	138	597
Mars Poultry Farm	Do.	110	581
C. Knoblauch	Do.	124	581
*A. W. Bailey	Do.	114	579
*Mrs. J. R. D. Munro	Do.	132	579
A. H. Padman, S.A.	Do.	123	579
R. Holmes	Do.	120	550
*Dixie Egg Plant	Do.	127	541
*T. Fanning	Do.	142	536
F. Clayton, N.S.W.	Do.	126	535

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
LIGHT BREEDS—*continued.*			
J. L. Newton	White Leghorns ...	123	531
Mrs. W. D. Bradburne, N.S.W. ...	Do.	129	530
G. Williams	Do.	122	524
L. G. Innes	Do.	131	522
G. Howard	Do.	140	522
E. Cross	Do.	137	515
Miss M. Hinze	Do.	103	503
J. Holmes	Do.	128	501
G. J. White	Do.	127	499
*A. E. Walters	Do.	124	496
Mrs. S. J. Sear	Do.	138	494
*C. C. Dennis	Do.	109	487
S. C. Chapman	Brown Leghorns... ...	141	487
Mrs. Carruthers	White Leghorns ...	117	481
C. H. Singer	Do.	131	475
C. P. Buchanan	Do.	135	471
E. A. Smith	Do.	127	471
J. Ferguson	Do.	125	470
*Dr. E. C. Jennings	Do.	121	410
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	149	744
A. E. Walters	Do.	133	697
W. Smith	Do.	149	696
*Mars Poultry Farm	Do.	145	671
W. S. Hanson, N.S.W.	Do.	147	633
F. A. Claussen	Rhode Island Reds ...	110	630
*E. F. Dennis	Black Orpingtons ...	139	610
Cowan Bros., N.S.W.	Do.	124	579
P. C. McDonnell, N.S.W.	Do.	118	561
D. Kenway, N.S.W.	Do.	102	557
Mrs. J. H. Jobling, N.S.W.	Do.	129	544
H. Jobling, N.S.W.	Do.	116	538
*E. A. Smith	Do.	151	515
King and Watson, N.S.W.	Do.	125	505
*Oakland Poultry Farm	Do.	129	504
C. B. Bertelsmeier, S.A.	Do.	142	499
R. Burns	S. L. Wyandottes ...	120	478
E. Morris	Black Orpingtons ...	121	474
*Kelvin Poultry Farm	Plymouth Rocks ...	139	463
*Miss M. Hinze	Black Orpingtons ...	148	462
J. M. Manson	Do.	132	452
C. C. Dennis	White Wyandottes ...	126	449
F. Clayton, N.S.W.	Rhode Island Reds ...	85	442
*F. W. Leney	Do.	122	403
Totals	... ...	9,505	41,105

* Indicates that the pen is entered in the single hen test.

DETAILS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
G. H. Turner	98	109	137	125	107	129	705
J. M. Manson	113	100	94	101	105	123	642
J. Zahl	122	88	124	59	129	101	623
J. R. Wilson	116	101	96	109	93	97	612
A. T. Coomber	108	49	119	111	99	114	600
A. W. Bailey	36	91	115	114	111	112	579
Mrs. J. R. D. Munro	134	86	89	87	67	116	579
Dixie Egg Plant	94	108	108	112	109	10	541
T. Fanning	62	95	102	93	81	103	536
A. E. Walters	60	73	77	97	103	86	496
C. C. Dennis	94	82	25	92	94	100	487
Dr. E. C. Jennings	31	48	78	86	107	60	410
HEAVY BREEDS.							
R. Burns	96	98	132	110	147	171	744
Mars Poultry Farm	101	130	99	121	110	110	671
E. F. Dennis	110	99	115	125	125	36	610
E. A. Smith	84	77	62	121	91	80	515
Oakland Poultry Farm	122	70	67	63	119	63	504
Kelvin Poultry Farm	81	71	67	121	49	74	463
Miss M. Hinze	85	69	72	83	88	65	462
F. W. Leney	69	69	39	60	109	57	403

TRUE TO TYPE.

The question of trueness to type has given us a good deal of thought and trouble. In all the breeds entered for the competition there is evidence of a very great deal of variation. Were this variation confined to differences between breeders, it could be understood, but it is found that the individual birds of a single breeder vary very considerably in type. Under these conditions, decision in this matter has been difficult, and those who have been declared ineligible are chiefly those whose birds show a decided lack of uniformity. Whether this is due to indiscriminate out-crossing caused by selecting birds from various sources without regard to their suitability to breed with the general flock, or whether it

is due to the infusion of the blood of other breeds with the object of gaining some fancied improvement in one direction or another, or whether the variation is due to a legitimate attempt to try different types to test their capabilities, it is hard to say. The point that stands out pre-eminent is that there is not even an approximate general conception of what the utility type of the various breeds should be, and this is certainly a matter of importance for the poultry clubs to take up; otherwise the breeds will lose identity. This year a very lenient view of the matter has been taken. Of those excluded, many have one or two good birds, but were spoilt by the inclusion of several birds of inferior quality. The following pens are ineligible for the true to type prizes:—

H. Jobling, N.S.W.	Black Orpingtons
F. Clayton, N.S.W.	Rhode Island Reds
R. Burns	Black Orpingtons.
T. B. Hawkins	White Leghorns
T. A. Pettigrove	White Leghorns
C. Knoblauch	White Leghorns
D. Fulton	White Leghorns
W. R. Crust	White Leghorns
T. Taylor	White Leghorns
C. C. Dennis	White Leghorns
J. Zahl	White Leghorns
W. Bailey	White Leghorns

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH AUGUST TO 26TH SEPTEMBER, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie's Lass ...	Ayrshire ...	5 July, 1917	1,097	3·9	51·52	
Lady Prim... ...	Holstein ...	3 Aug. ,,	1,056	3·7	45·79	
Sweet Meadows ...	Jersey ...	8 Aug. ,,	543	6·2	39·89	
Queen Kate ...	Ayrshire ...	30 June ,,	967	3·4	38·42	
Confidence ...	,, ...	25 June ,,	712	4·0	33·44	
College Damsel ...	Holstein ...	12 July ,,	1,021	2·8	33·21	
Lilia	Ayrshire ...	11 June ,,	881	2·8	28·64	
Hedges Dutchmaid	Holstein ...	9 Sept. ,,	684	3·4	27·16	
La Hurette Hope	Jersey ...	22 Aug. ,,	534	4·1	25·72	
Miss Bell	,, ...	27 June ,,	436	4·7	24·15	
Lady Melba ...	Holstein ...	14 Feb. ,,	568	3·6	23·95	
Nina	Shorthorn...	6 Sept. ,,	529	3·7	22·93	
Netherton Belle ...	Ayrshire ...	17 July ,,	541	3·5	22·15	
Princess Kate ...	,, ...	28 June ,,	477	3·8	21·24	
Hedges Madge ...	Holstein ...	22 Mar. ,,	425	4·2	20·97	
College Bluebell ...	Jersey ...	28 June ,,	565	3·1	20·48	
Lady Dorset ...	Ayrshire ...	14 Aug. ,,	555	3·1	20·05	

The Orchard.

CITRUS CULTURE.

(Paper read by ALBERT H. BENSON, Director of Fruit Culture, at the Fruitgrowers' Conference, held at Palmwoods, 6th October, 1917.)

In response to the request of your Committee to say a few words on the value of spraying, fertilising, and of experiment plots, I have thought it best to put the matter in writing in as brief and concise a form as possible, as, unless I do so, I may be tempted to go into details that will take up far too much of the time of this Conference, as each of these subjects is a very comprehensive one.

SPRAYING.

The object of spraying is to distribute as evenly and economically as possible the various remedies that are used for the destruction of insect and fungus pests. In practice, this is best accomplished by distributing these materials in a liquid state by means of a powerful force-pump which will either force the spraying material into every crack and crevice of the trunk or main branches of the tree or will distribute it in the form of a mist-like spray that will reach every portion of the tree or plant that is to be treated. There are many excellent plants suitable for the work now on the market, from the knapsack sprayer, which is carried on the back of the operator, to powerful motor-driven pumps. The latter, where the orchard is large enough to warrant the expenditure, should always be used, as, owing to their power, they can distribute the spraying material much more rapidly, economically, and effectively than can be done by hand-power machines.

The efficacy of the spraying depends on three primary considerations:—

1. That the work be carried out in a thorough manner.
2. That the spraying be done at the right time.
3. That the right spraying materials are used.

With regard to the first, nozzles throwing a fine spray with considerable force should be used for spraying both the trunks and main branches—in fact, all the inside of the tree—so that the spraying material may be forced into every crevice, as well as the outside of the tree, so that every twig and leaf shall be reached. It is not necessary to drench the tree; it should be completely covered by the spraying material, but as little as possible should be allowed to run off. It is what sticks to the tree that does good—not what runs off.

With regard to the second essential, that of spraying at the right time, this is of the first importance, and it is a matter that deserves much more careful attention than it frequently gets. The best time to spray depends, of course, on the pest it is desired to destroy or prevent. Thus, the damage that is caused by all leaf-eating insects is reduced to a

minimum by spraying the plants or trees on which these insects are feeding with a material that will adhere to the foliage, and which, when eaten by these insects, will poison them. The best of all remedies for this particular class of insect is the spraying with arsenate of lead, used at a strength of from 3 to 4 lb. of the paste to 100 gallons of water, or 1½ to 2 lb. of the dry powder to the same quantity. In the case of all scale insects the best time to spray is when the young insects are hatching out, and this can be learnt by careful observation. When the young scales are first hatching out they are exceedingly easy to destroy, as they have no scale protection on their bodies; consequently, very weak sprays kill them immediately on coming in contact with them. When the insects have developed their scale covering, much more powerful sprays are needed. The sprays that are most useful for dealing with this particular class of insect are those that kill them by actually touching them, or those that kill them by covering them with a mixture which prevents their breathing. Of the former, the best remedies at present are the so-called residual oils, of which the red oils are a well-known type. These oils must not, however, be used excepting during a period that the tree is in active growth, as if the tree is dormant, and particularly if it is suffering from the effects of dry weather, there is a possibility of these oils being absorbed by the bark of the tree, which will have the effect of causing a quantity of the leaves to fall and possibly injure the smaller twigs. A strength of 1 in 40 of red oil will do more good when young scales are hatching out than a 1 in 20 solution when these scales are fully matured. The lime-sulphur wash is also an excellent remedy for scale insects. When used at its winter strength of 1 part of the standard solution (32° Beaume) to 8 to 10 parts of water, it will destroy fully matured scales, but the young scales are destroyed with comparatively weak solutions of 1 part of the standard solution to 30 to 35 parts of water. Washes in which resin and caustic soda form the principal ingredients are also valuable for destroying scale insects. These washes act in two ways—they actually destroy by touching the insects, and further, they form a glaze over the insects which prevents them breathing, and thus destroys them. These sprays, however, are not now anything like as commonly used as the red-oil sprays or the lime-sulphur. The latter remedy is also extremely valuable for the destruction of all types of spinning and other mites, such as the red spider, the Bryobia mite, and the well-known Maori mite, as the fumes of sulphur which are given off by this spray are extremely efficacious in destroying all these insects. In the case of Maori, these insects usually appear in large numbers about the end of December, and if they are dealt with at once by means of a weak lime-sulphur spray or by means of a soda-sulphur spray, the damage that they would cause were they left alone can be entirely prevented, and instead of having large numbers of blackened oranges, the crop will be clean and bright.

SPRAYING FOR FUNGUS DISEASE.

Many sprays which are efficacious in the case of insects—such as arsenical poisons, oil washes, resin and soda sprays—are of little if any use for the treatment of fungus diseases, as they have not the power to

destroy the spores of the latter and are therefore useless for preventing either infection or for keeping the diseases in check once they have become established.

Fungus diseases, therefore, require special treatment and the use of sprays that are approved fungicides. Several materials possess fungicidal properties to a marked degree, such as sulphuric acid, sulphide of iron, carbolic acid, formalin, kerol, lysol, &c., and are used for special purposes, but are not as generally useful as copper salts, such as bluestone and carbolate of copper or of the various sulphides of lime, soda, or potash. Bluestone is used in conjunction with lime to form Bordeaux mixture, or with soda to form Burgundy mixture, and both of these mixtures form excellent sprays for such diseases as Irish Blight, Black Spot of grapes, Black Spot or Brand of the orange, Melanose, Canker, and removal of mosses or lichens from the trees, but are not, in my opinion, equal to the sulphide washes for such diseases as Dieback or Twig Blight, the so-called Exanthena, gumming, &c. The sulphide washes have also one great advantage over copper sprays, and that is they possess powerful insecticidal qualities where used as winter sprays at an increased strength or at a summer strength when young scales are hatching out. I am, therefore, very partial indeed to the use of these particular sprays, and I consider that, as an all-round spray, nothing has yet been discovered that equals the lime-sulphur wash, as it can be used in a concentrated form on the trunks and main branches of the trees during the winter, and also in the case of deciduous trees all over the tree after pruning, and such application is extremely effectual in the destruction of all scale insects and all classes of bark fungi, and undoubtedly has beneficial effects in preventing or checking gumming. Used at the summer strength it is, as I have already described, an excellent remedy for the destruction of young scales, mites of all kinds, and as a general fungicide.

Briefly, the systematic spraying of the trees during the winter with lime-sulphur and where scale insects are very numerous a subsequent spraying in spring with a weak solution of red oil will usually be found all that is necessary; but if any kind of mites or fungus diseases are very prevalent then a week lime-sulphur wash is preferable to the oil. In order to obtain the best results from spraying, the systematic pruning of the tree should be carried out in conjunction therewith, as, in the first place, proper pruning and thinning-out of the tree enables the spraying material used to be distributed to better advantage; and, secondly, the cutting away and burning of all diseased wood is one of the very best means that can be taken to keep down the various fungus diseases of citrus and other fruit trees.

FERTILISING.

The object of fertilising land is to replace the plant-foods that have been removed from the soil by the growing of crops, as it is found in practice that the selling off the land of large quantities of fruit annually gradually results in the depletion of the plant-food in the soil, as such fruit, when sold, takes away in its ash considerable quantities, particularly of such substances as nitrogen, phosphoric acid, and potash,

which must be returned to the land in the form of a fertiliser if the inherent fertility of the soil is to be maintained. The bulk of our coastal soils, except those on which dense scrub was originally growing, or soils of an alluvial nature such as those adjoining the banks of creeks and rivers, are usually low in plant-food; consequently, sooner or later, they require fertilising in order to keep up their fertility and productive powers.

Generally speaking, all such lands are comparatively poor in available phosphoric acid, potash, or nitrogen. One of these ingredients only may be deficent, or it may so happen that there is a deficiency of all three. In the latter case, complete fertilisers must be applied—that is to say, fertilisers containing all these ingredients in an available form. On the other hand, when only one or two of these essential plant-foods are lacking, then this essential plant-food or foods must be made good. Of these plant-foods, nitrogen can be returned to the soil either in the form of green-crop manure or in the form of a commercial fertiliser, such as nitrate of soda, sulphate of ammonia, dried blood, or nitrate of lime, or in the form of organic manures, such as meatworks fertilisers, bonedust, &c., where it is combined with phosphoric acid. Phosphoric acid can be returned to the soil in the form of bonedust, meatworks manures, Thomas' phosphate, superphosphate, or ground phosphatic rocks. In the case of superphosphates, the phosphoric acid is readily available; in other words, it is soluble in water and can be taken up by the plant at once. In the case of bonedust, finely ground meatworks manures, and Thomas' phosphate, the phosphoric acid is in a less soluble form but still readily available, but in the case of rock phosphates it is only very slowly available. Potash can be returned to the soil in the form of potassic salts, such as sulphate or chloride, which are obtained from big deposits that are met with in Germany. Just at present, owing to the war, this source of supply is cut off, consequently potash salts are extremely hard to obtain. Large quantities of potash are, however, annually lost in Queensland in the excrements of our domestic animals, which are frequently, in fact usually, allowed to be wasted. Were these conserved, as is done in the older countries, we should not now be feeling the deficiency of potash which is apparent in many of our poorer soils to-days. Lime is not, properly speaking, a manure, except in soils that are absolutely deficient in this material, but on account of its valuable properties, such as the rendering of any plant-food present in the soil more readily available, its sweetening sour soils, its encouragement of bacterial action in the soil, and its ameliorating effects on heavy soils and its consolidating effects on light soils, it is frequently looked upon as a fertiliser, and for all fruit districts in Queensland it is undoubtedly essential. Lime can be applied to soils either in the form of freshly burnt limestone, air-slacked burnt lime, or ground unburnt limestone. In the first form it is extremely valuable for neutralising the acidity in the soil and has also a powerful action in breaking down stiff, clayey soils; but its action is somewhat too severe in the case of naturally sweet soils and those in a perfect mechanical condition, as it is apt to injure the organic conditions of

the soil and to retard for a time nitrification. Air-slacked lime can be applied practically to all soils, as during the process of slacking the lime is converted into a fine powder which can be spread easily and evenly over the ground.

The difference between caustic or freshly burnt lime and air-slacked lime is that the former when slacked takes up from the air a quantity of carbonic acid gas, so that 56 lb. of freshly burnt pure lime will weigh 100 lb. when slacked. The slacked lime is in the form of a hydrate of lime combined with a certain amount of carbonate of lime and the hydrate rapidly becomes converted into carbonate. Ground limestone is a carbonate of lime. In other words, finely ground limestone is practically the same substance as caustic lime once it has become thoroughly air-slacked and has become reconverted into the carbonate. With regard to the value of the different forms of lime, roughly speaking, 1 ton of freshly burnt limestone is equivalent to 2 tons of air-slacked lime or 2 tons of finely ground limestone, so that the purchaser can easily determine which is the cheapest form in which to purchase lime. Air-slacked limes or finely ground limestone are not as quickly acting in the case of heavy soils as freshly burnt lime, but they are more generally beneficial in their action in that they promote nitrification, improve the mechanical condition of the land, and also tend to correct any acidity that may be present therein. Caustic lime must never be applied in conjunction with other manures, particulary those containing nitrogen either in the organic or most inorganic forms, as it tends to free the nitrogen and cause serious loss. Finely ground limestone, on the other hand, can be used with any other manures without any danger whatever. With regard to manuring generally, quick-growing crops such as vegetables require the fertilisers used to be in a readily available form, so that the plants can get them right away, but in the case of fruit trees it is always advisable to use a certain proportion of the fertilising material in a less available form, as thereby the action of the manure is spread over a longer period and the trees are not overfed at one time and underfed at another. It is not necessary for me to enter fully into the details of manuring at this Conference, as full particulars respecting this subject can be obtained from the pamphlet issued by the Chemist of the Department of Agriculture and Stock, which goes very fully into the whole question.

EXPERIMENT PLOTS.

I am very strongly in favour of the establishment of farmers and fruitgrowers' experiment plots by the Department, as I consider that such plots are a practical means of bringing home to the farmers or fruitgrowers of any particular district the value of particular methods of culture, pruning, fertilising, the treatment of disease, or any other points on which growers require special information. Such experiments do not need to be extensive and need not cost the country a very great deal of money. At the same time, careful records must be kept and, whether the experiments are successful or otherwise, full and definite details of same should be published and be available for the information

of all growers. There are many matters that are constantly exercising the attention of growers that can be dealt with collectively rather than individually; in other words, a series of experiments carried out at one centre in a district will prove of value not only to every farmer or fruitgrower in that district but also will be of more or less value to fruitgrowers in other districts. Already certain experiments have been carried out by this Department in years past, such as the manurial experiments that were carried out by the Agricultural Chemist and the writer in connection with the growing of pineapples and bananas—experiments which definitely fixed the important question of manuring these crops. Many experiments were also carried out in the treatment of various fruit pests both with respect to spraying and cyaniding, and I am of the opinion that there is still ample scope for numerous experiments to be carried out in the different fruitgrowing districts throughout the State, as we have still many matters on which we require very much fuller and better information than we possess at present. For instance, owing to the very great increase in the planting of bananas in Southern Queensland during the past six or eight years, there has been a tendency to plant this fruit on any class of land and to set out plants irrespective of their freedom from disease or suitability for such land. The result has been that the flask-worm or nematode, that was first described by Dr. Bancroft some thirty-eight years ago, has been spread throughout most of the banana-growing districts of the State, and I am sorry to say it is doing a considerable amount of damage. This particular pest is an extremely difficult one to combat, and, so far as is known, no treatment other than the rotation of crops has been found efficacious in any part of the world. The matter, therefore, is of such importance that experiments are to be conducted, both in the Southern and in the Northern parts of the State, in order to determine whether any remedial methods can be found that will in any way tend to lessen the damage caused by these insects. The question of the systematic pruning of fruit trees is also a matter that requires careful experimental work. And, in addition to these two instances, there are many matters which can be dealt with experimentally with probable benefit to our producers.

From these remarks you will therefore know that I fully appreciate the value of experiment plots, and as far as means permit I shall encourage such experiments.

CITRUS CULTURE.

(Paper read by S. C. Voller, Assistant Instructor in Fruit Culture, at the Fruitgrowers' Conference, held at Palmwoods, 6th October, 1917.)

As this Conference sits only for one day, and there must naturally be many matters of interest and importance to deal with, I purpose making my address as concise and direct as possible.

I am appearing on this occasion in response to a long-standing request from the Palmwoods growers for a lecture on "Citrus Culture." This was desired because there are a good few who have started in this line during recent times, and, having young orchards coming along, they wish for what light I can give them on the subject. This being right in the line of my official duty, I have much pleasure in acting.

QUEENSLAND'S CAPABILITIES.

There can be no doubt in the mind of any well-informed person as to the capabilities of our State for citrus production. During the years that have passed since the first of our early pioneers planted seeds or trees, the rapidly expanding area of cultivated land on the whole length, almost, of the Eastern coast has given, and is still giving, ample proof of what can be done, while further inland our Western country stands waiting for the call, should it ever come, and is ready to respond. And what a response is possible! We may well be pleased, even proud, of what has been done in some directions on the coast; we are justified in expecting greater things here by far than we have yet reached; but, in my opinion, in the West will some day be seen the real answer to the question as to what we can do in citrus production. When the day of really large requirements comes, much as we know we can do on the coastal areas, the West can beat us in both quantity and quality. The areas of land are there, the quality of soil, and the climate backed up by good bore water, capable of turning out unlimited quantities of fruit as good as anything on earth. That is my opinion of Queensland, and we have had in support of it proof put forward by more than one place. The Roma district and the country at Barcaldine may be mentioned in this connection.

The finest Navel oranges I ever saw anywhere came from the West. The best lemons I ever saw in Queensland were at Barcaldine. One could go on in this strain to further length, but it is not necessary.

SOILS.

We have, fortunately, a pretty wide range of soils that will grow citrus fruits successfully. As you all know, the coastal soils vary considerably. We have all sorts between the deep, rich, red soils of such districts as the Blackall Range and practically pure sand in other places. Colour does not matter. The things that do matter are quality, texture, depth, natural drainage, and a level lay-out of land surface if you can possibly get it. Granted the right texture and good depth you will have good drainage within a reasonable limit. You may have good quality and texture without depth, and in that case you must either drain artificially or plant somewhere else if you do not want to fail. Quality is desired because poor land requires all the more feeding; free texture, or freedom from sticky, binding character, is absolutely necessary to allow of good, deep, free rootage below and good growth above; drainage you must have or your trees will never succeed as they should.

We have lots of good land in many directions, but it will answer all practical purposes in connection with this address if I tell you that,

according to my judgment, right here in Palmwoods you have that which it will be hard to beat anywhere. This is said, of course, without prejudice in any way against any other part of the State.

DRAINAGE.

A word or two on drainage. Many people think that land is well drained because it has a good slope. This is all right from the point of view of one who wishes to get rid of surface water, but in the case of the agriculturist the idea is utterly wrong. No orchardist has any use for the rainfall that only rushes over the surface of his land and goes right away. The moisture is needed, of course, in the soil, and the drainage capacity desired in that soil is such that the rainfall can go in and down through the whole body of it and find an easy exit below for whatever surplus there may be. In these conditions the soil naturally retains what it needs; and it can hold, even in very free compositions, just what it needs, generally speaking.

A slope with the right texture and depth of soil will generally be found safe as to drainage. A slope, especially a long one, that holds beneath the surface any obstruction such as clay or rock, both of which frequently occur in bars or layers, is useless because the excess of moisture works down hill and is thrown out in wet or boggy patches by the obstruction mentioned. You cannot succeed with citrus fruits in shallow or badly drained soil: bad drainage means stagnation, and stagnation means poison, and you can guess the result. I am particularly emphatic on this drainage question because I have had some extensive and valuable experience in connection with it. At my own home, over forty years ago, underground drains were put in, in part of our orchard, to counteract the effect of a defective subsoil. This was an almost impervious granitic formation, the soil itself being also granitic. Before this, young trees absolutely refused to grow. They could not do it, but stood there in actual misery. When the drains were put in, a sudden remarkable change took place. There was a positive transformation, and those trees never looked back. I can say for your information that those drains hold good to-day.

In another instance I planned and superintended a complete drainage scheme for another property, involving considerable outlay in both labour and material. Here it was a case of fighting the enormous soakage underground from surrounding granite ranges, which, being porous, absorbed most of the rainfall, only to throw it up again in the lower country in the shape of springs and bogs. You can guess what drainage means to an orchard when I tell you that in this case the outlet-pipe of the system was 12 in. in diameter inside, and I have known that pipe run full for a fortnight. It was not a case of shallow or inferior soil here by any means, but an unusual intake in soakage. The result here has remained permanently good, as it is pretty near thirty years since I did that job.

PREPARATION OF LAND.

Wherever it is possible to do it the land should be well prepared before planting the trees. Deep and thorough working, as well down

into the subsoil as you can go, will be well repaid. We need deep rootage, and the only way to secure that is to make it possible for the roots to go down. In some soils they can and do do this with very little aid from deep working. In other soils—such as some of our rich, greasy scrubs—the chances are against good deep rooting. This is mainly due to the fact that the stumps and roots absolutely prevent the breaking up of the land, so that trees are planted without this; and also that later on, after the roots and vegetable matter in the soil have disappeared, the land, under the marked changes of weather, sets so close as to be almost impenetrable. On all our scrub lands where trees have been planted it will pay the grower well to start in with deep and thorough cultivation both ways as soon as the stumps can be got rid of—that is, of course, supposing the land is level enough. This will very largely make up for the lack of preparatory work before planting.

PLANTING.

Granted the right class of soil properly prepared, I would advise planting from 25 to 30 ft. apart on the square. The closer distance for lemons, limes, and mandarins, and the greater for oranges, including Sevilles. If the soil is of the right sort, and properly worked up, it will not be necessary to open a huge grave in which to plant the tree. A couple of feet square opened out according to the rootage of your trees, and well broken in the bottom with the bar, will be quite good enough. The roots of young trees should be carefully studied and trimmed as may be needed. You may safely trim off all small fibrous stuff at the top if such there should be, and use the stronger and main roots, placing them as carefully as you can to ensure their getting a good start down into the soil. You do not want a growth of young roots on the top of the ground. I have always been against this. We want the roots to grow and work outward below our well-cultivated surface. They can be made to do this. In some classes of poorer soils manure may be added at planting time, when it should be judiciously mixed with the soil as it is filled in. Richer soils will not need this, perhaps, till later on when the trees begin to bear.

The question of depth of planting must not be overlooked. On slopes where the soil is pretty certain to be lost to some extent by washing, I would say: Plant as deeply as you dare, leaving the upper part of the holes not quite filled, like a saucer. Keep the surface like this if you can for the first few seasons. On good level land, with no danger of washing, I advise the exercise of common sense and moderation. You can plant trees so high out of the ground that you spoil them; on the other hand, I have seen many young trees so deeply planted that they could not grow, and they did not grow.

In marking out for planting, use a No. 12 wire long enough to do half, or a good part, if not the whole of the row. Measure the distances for your rows along the headlands, put in strong pegs there, have a ring at each end of your wire, and a dab of solder on the wire every 27 or 30 ft., or whatever distance you intend planting; draw the wire

tight and drop the ring over the pegs at the ends, and you cannot go wrong in placing your trees. Each dot of solder means a tree, and you cannot make a mistake, and you lose no time dodging about. After planting, follow up reasonable light cultivation to kill weeds and conserve moisture.

PRUNING.

The work of pruning is a matter of the greatest importance, and it begins with the early youth of the tree. Properly trained nursery stock will not require much treatment, and, unless the young trees have long or irregular tops, it is not a good thing to cut them about when planting out. Begin your cutting when the shoots come and you will avoid a partial dying back of the top which frequently occurs on trees cut back at planting. When the growth starts make up your mind that you are going to control the trees properly. The first thing of all in pruning is to understand your tree, the next that you are master of that tree, and then things fall into line as you exercise that mastery. The young tree should be trained with a foundation of three or four good, sound limbs as evenly placed as possible, and to get them it is sometimes advisable to cut the head clean off the young tree. Trunks should be established about knee high. Do not start your first main limbs too close together, as in later years the tree may split if bearing heavy crops. As growth goes on and the tree increases in size, it will be found that the heads of the original limbs develop until they may in turn be divided into sections, each having its own head or top and outer growth to be considered and arranged for.

This will include the opening out and freeing from small and useless growth inside of the tree on the main limbs and their continuations further up. Avoid the multiplicity of prongs in the forks like hayforks, or the development of "gridirons" amongst the branches. We often see plenty of this amongst the orchards. The bulk of our orchards are badly neglected in the matter of pruning, and it cannot be too well remembered by all our growers that the objects of pruning are to conserve power, to avoid waste, to direct the energy of the tree properly, and to produce a fair and profitable crop of good-quality fruit, instead of an enormous amount of small, inferior, and useless stuff. It does not pay any orchardist to grow small or poor fruit. It does pay to grow really good stuff and keep on growing it, and one of the greatest helps to this is systematic pruning. I would earnestly urge, as we have done for years, all our growers to pay more attention to this matter. Over and over again people have said that I was too severe in my pruning work, but I know what it works out to, and my advice to-day is: Don't be afraid to cut once you know what you are at. Especially is it necessary to prune unmercifully in connection with some of the diseases we have amongst the trees. Speaking in a general way of pruning, it may be said that the man who understands his trees will always work, and very often almost unconsciously, with the model of what the tree ought to be carried in his mind. Then, as the work goes on and tree after tree is dealt with, you will find the "scheme" of the work showing out very effectively.

It may also be said that good pruning conduces to good health because it avoids the crowding up of a lot of scrubby wood and, at the same time, the breeding up of a lot of troubles that are encouraged in the unpruned tree. Further than this, there is the outstanding enormous benefit gained in connection with spraying. No man on earth can make a decent job of spraying in a lot of the badly grown trees we meet with. It cannot be done, and therefore the owner of such trees is always at the mercy of his enemies and never has much chance of getting clean fruit. You can spray with half the stuff, half the trouble, in half the time, and make ten times the good job of it in the case of trees that have been well pruned. I am not in favour of pruning extensively while the trees are in bloom, or when there is a burst of young growth on, but beyond that I would not hesitate to prune at any time. Probably the best time of all is when the crop has been gathered early enough to have the trees still dormant.

Reference may also be made here to root pruning. We know the value of root pruning in regard to other things besides citrus trees. Grape vines especially call for careful attention in this respect, and pay for it when they get it. Practically, all fruit trees are the better for some control being exercised over their root growth. I have already stated that I do not want the roots of my young trees on the top of the ground. For forty years or more I have followed a style of cultivation that did not allow of purely surface roots running over my orchard. My advice is to deal thoroughly with these in all cases where the lay of the land allows good cultivation. On steep slopes, especially with variations of soil, you have a different problem, and a queer one at that. To my mind, the reason why roots of citrus and many other trees come to the surface is to breathe, to drink, and to feed. In uncultivated places you find the roots right on the surface. In well-cultivated land there is no need for them to come right to the surface, and they won't do it, because moisture, food, and air are all sent down to them; and then, in addition, they get the advantage of a good natural soil mulch. In regard to the roots the same may be said as was said of pruning the trees—that you are the master, and you must study your tree and all its surrounding conditions and control it accordingly. It appears to me that in view of the attack of root borers in citrus trees, as has been discovered in recent times in certain parts, we shall very likely find ourselves up against a very peculiar problem in root pruning. A word or two may be said here of the interesting work done in the North Coast districts recently, and still being carried on, by Mr. Scerri. Many of our growers know of his pruning both above and below ground. Probably the most pronounced of his work is done in root pruning, and it will be a matter of interest to all growers to note the results of this. In our opinion time will be necessary in this direction.

CULTIVATION.

Your orchard can never rise to its best without good cultivation. Many orchards are planted where such work is an impossibility, and sooner or later, in one way or another, they must inevitably suffer. Good cultivation should begin before the trees are planted, and this

initial part should consist of deep working and thorough preparation of the soil so that your young trees will make themselves at home from the start. I cannot, in this paper, go into too many details; but it may be said that, with a pretty wide choice of implements, it is not a matter of serious difficulty for a man to begin with good work and keep it up afterwards. Good ploughing—and this to a decent depth, too—in the winter, light ploughing and other styles of work through the summer, and careful attention by hand labour under the trees themselves is what is needed. Sometimes a summer ploughing will do the world of good in turning in a fine growth of weeds or a mixture of weeds and crop. It does not appear to me as necessary for a man to be always tearing his orchard soil about with some kind of tool or implement. Sometimes you can do harm by an inopportune tearing up by interfering with some of Nature's wonderful processes of dealing with a lot of stuff that had, perhaps, been recently turned in with the plough.

Sometimes a man will do better by using a set of harrows only, instead of a plough, when the question of the conservation of moisture is an urgent one. Sometimes, especially in drier areas, one can plough on a sudden chance fall of rain such as may occur with a storm, and do a lot of good too. Sometimes you will do most good by leaving your soil and your trees in peace for a while. But do not turn this into an excuse for neglect. Neglect is the basis of pretty well all trouble in orchard work, as it simply opens the door for all our enemies to march right in. In regard to the question of cultivation on steep slopes, all we can say is that a man must use his judgment and be guided by circumstances. All soils are not the same; some, even on slopes, wash away more easily than others, while some may be retained and worked with far greater success than others. There can be no doubt that there is and always will be a difficulty here, because, sooner or later, if you persist in trying to cultivate properly you will be caught and will lose your soil; while, on the other hand, if you do not cultivate you get trouble in other directions. The relationship between good deep cultivation and good deep rootage must never be lost sight of. Without the right method of soil-working you cannot properly control your roots. Finally, good cultivation means that your trees can get the best out of your land; and that is what should be aimed at.

WHAT TO PLANT.

A word of advice may well be given on this matter. New growers will do well to avoid going in for too many sorts. If you are going to grow for commercial purposes, then go for one or two good lines in fair quantity so that you can meet good orders for what consumers want. Do not go in for fancy work. Such sorts as Valentia Late, Dunning's Navel, Jaffa, Mediterranean Sweet, Sabina, and Siletta will give plenty to pick from in oranges, and I would only choose about three at the outside. In mandarins a couple of good ones is plenty. As to lemons, care will be needed mainly because, on the coast, our lemons are so scabby. Apart from that, if a lemon is grown on the coarse side,

it will do for candied peel, and for good shop stuff for drinks the market is pretty safe. Sevilles, in my opinion, will yet come in to their own in Queensland, and when they do their value to the grower will be discovered in no uncertain way. I put this down as one of the most profitable of the citrus family, granted a fair market value, and taking many points in connection with production into consideration. I would advise the planting of good, sound worked trees only, of all kinds. The grower has much to gain and little, if anything, to lose by this.

DISEASES AND PESTS.

The name of these is legion, and on this occasion I can only deal briefly with this section of my subject. They may best be described under Mr. Benson's old classification of a good many years ago as follows:—

Insect Pests.

1. *Insects that Live by Suction.*—In this class all scale insects, aphides, mites, and sucking-bugs, are included. Most of you are well acquainted with the general list of these enemies, and I need not do more now than refer you for further detailed information to the pamphlets issued by the Department of Agriculture and Stock. The same remark will also apply in the matter of remedies. These are all set out in proper order, and I would only say here that to the old list must be added such spraying compounds as the oil sprays now on the market.

2. *Insects that Destroy Foliage, Skin of the Fruit, &c.*—This class includes all those insects that actually devour their food, other than those to be presently dealt with, as distinct from those already mentioned which live by suction. For the whole of these there is one great remedy —viz., to poison their food. In my own opinion two things stand out above all else that I know of for this purpose. These are arsenate of lead and Bordeaux mixture. With the latter I have had some splendid results against caterpillars, grasshoppers, and particularly against the corn moth in citrus crops. Both these mixtures deserve attention from our growers, and of Bordeaux mixture it may be said that while it is acting as a poison it is invaluable as a fungicide amongst citrus.

3. *Insects Boring into the Fruit.*—Our old friend the fruitfly comes in here, followed by such as the peach moth and corn moth.

4. *Insects Boring into the Tree.*—Here are included the larvae of several species of beetles which do serious damage to citrus trees by boring into either the trunks, limbs, or roots. Briefly, I may say that against this class of pest we put good, careful pruning, because before an attack you can see all through your trees and also spray all through them easily, and the beetles may be thus caught at the start; also, after an attack you can more easily detect it, and follow up the enemy at once with little or no difficulty. Further than that, well-pruned trees do not offer the same attraction to any pests that scrubby ones do. Next, destroy all elephant and longicorn bettles that may be seen on the trees at any time. They may be destroyed by catching them, or they may be poisoned by sprays, as they feed on the young bark and leaves. The root borer, at present causing some anxiety in some parts, is, in my

opinion, deserving of the most careful attention, as can be seen at a glance at samples of his work which I have here for your notice.

Fungus Pests.

To quote Mr. Benson's pamphlet: "Parasitical fungi of many kinds attack all portions of citrus trees—the fruit, leaves, branches, trunks, and roots all being more or less subject to their ravages. The humid climate of our Eastern seaboard is conducive to this development, whereas they are conspicuous by their absence in the warmer and drier parts. If neglected, they cause considerable damage; but, fortunately, we have remedies the application of which reduces the loss to such an extent that they are not any serious menace to the industry."

These are Mr. Benson's words, and I would like to call your special attention to them where he says: "We have remedies the application of which reduces the loss," &c. I agree with this, but at the same time I want to say this now, that if these remedies are not applied, the citrus-growers have fungus troubles silently, slowly, but surely developing and spreading that will give all the trouble and loss you will ever need without the aid of any other enemies.

1. *Fungi Attacking the Fruit.*—These are with us; mainly Melanose, Black Brand or Black Spot, Brown Spot (found here on both mandarins and oranges, though mentioned by some authorities as Brown Spot of the Mandarin), and Blue Mould. The treatment for all these may be put in a nutshell, thus: Merciless pruning, according to circumstances; the prompt burning of all prunings; and periodical spraying with Bordeaux mixture or lime-sulphur mixture. Generally speaking, we prefer the latter because it kills more enemies of other kinds at the same time than the Bordeaux mixture does. Both are first-class sprays for the particular line of treatment, and where trouble is at all severe they should be repeated two or three times in the year.

2. *Fungi Attacking Trunk and Branches.*—There are quite a number of these more or less troublesome, some being deadly in their attack. They are seen appearing in various colours and forms. In colour they range from deep black, just like blotches of ink, to almost white. In form they are at times like rusty blotches, sometimes leathery; again at times of a cankerous appearance; and they may also be found like streamers or strands of cobweb running along the branches and down the main wood or trunk. The same remedies apply here and are promptly effective.

3. *Fungi Attacking the Roots.*—More than one of these may be found in citrus orchards, and generally in land such as scrub or semi-scrub having plenty of stumps and roots in the soil for some time after planting. Where any attack is found, cut out affected roots, working back on to clean bark and wood; dose the soil with lime in which is mixed a handful or two of coarse salt. Don't put this down in lumps or heaps, but sow it on and mix with the soil by working in. Another fine cure for root fungus is salt water. Dissolve a double handful or so of coarse salt in a kerosene tin of water and distribute this evenly over

the surface and let it soak in. The quantity to be used depends on the size of the tree. In addition to fungus pests there are certain mosses and lichens which grow on our trees, and these may be mentioned as coming under the same treatment in spraying.

Useful Fungi.

It may not be generally known to citrus-growers that amongst our best friends are two or three small fungi that attack scale insects and clear them off the tree frequently. The most remarkable instance I have ever seen of this action was at Redlynch, in the Cairns district, where growers were almost relieved of the necessity for spraying by reason of the wholesale attack on scale by these fungi. These friends are in colour red (like little dots of red coral), sometimes grey, and again, in other cases, blackish.

NEW DISEASE OF THE PINEAPPLE REPORTED.

Mr. D. B. Mackie, Entomologist to the Bureau of Agriculture, Manila, writes in the "Philippine Agricultural Review," vol. X., No. 2, 1917:—

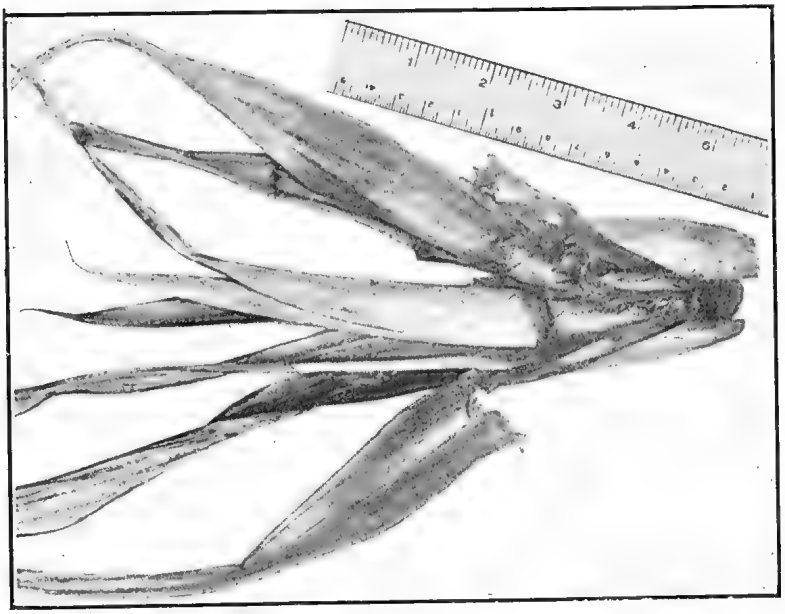
"The attention of the Bureau of Agriculture has been called to the presence of a disease affecting pineapples in the Archipelago which, if allowed to spread and become distributed, may prove a serious menace to this crop. The disease has been noted on the varieties known as Smooth Cayenne and Queen. It causes a hypertrophy of the tissues which gives them a rough corrugated appearance. It has also been noticed that the suckers prepared for shipping which show these same corrugations often develop a heart-rot, which causes the entire heart to become shiny and easily pulled out. Whether this rot is characteristic of the disease is not yet known, but it has been noticed on about 10 per cent. of the suckers which also showed the corrugation.

"In Hawaii there is a disease of pineapples which the Territory has subjected to a local quarantine. A rule of the territorial regulations states that all persons and corporations are prohibited from carrying, transporting, or shipping from the islands of Kauai or Oahu any pineapple, fruit, plant, or sucker, and none of them shall be allowed to land at any port in the Territory. For a violation of this regulation a fine not to exceed 500 dollars (£100) is imposed.

"Correspondence with the Hawaiian authorities leads this Bureau to believe that the disease which has been reported from Binan, Laguna, and from Pinelands, Nueva Ecija, is the same which has proved so troublesome in the Hawaiian Islands.

"As little seems to be known of the disease, affected plants should be pulled out and burned; also particular care should be exercised to see that no infected suckers are used for propagation or for distribution. While the pineapple can hardly be termed a commercial crop in the Philippines, one company cultivates it on an extensive scale, and has proved that its culture is a commercial possibility."

The plate gives an idea of the appearance of the diseased stock.



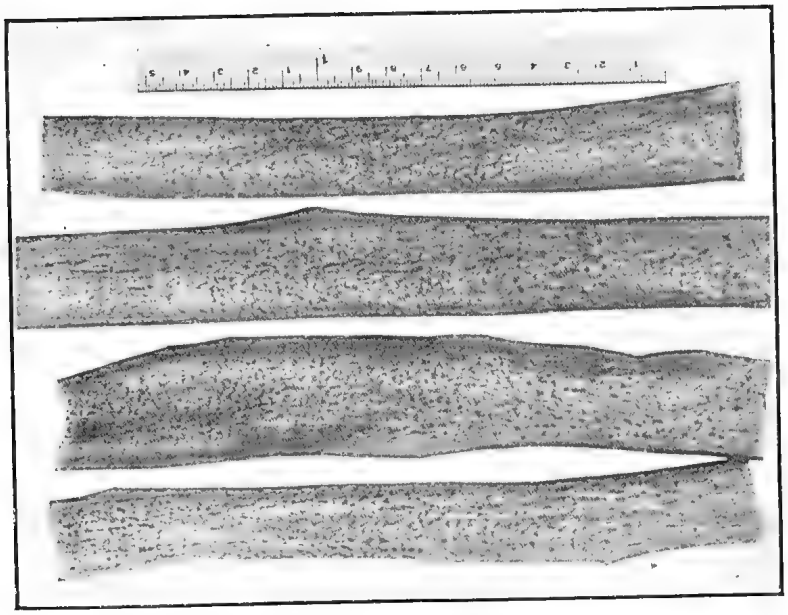


PLATE 33.

(A) Diseased Leaves of Pineapple, showing corrugations.

(B) Diseased Pineapple Sucker, showing heart rot.

Botany.

RECORDS OF A FEW ALIEN PLANTS.

By C. T. WHITE, Acting Government Botanist.

At the October meeting of the Queensland Royal Society, Mr. C. T. White, Acting Government Botanist, read the following notes accompanying an exhibit of plants met with as strays from cultivation, &c.:—

"Of late several plants have been brought in or sent in for identification as having been met with as naturalised or strays from cultivation; in some cases the specimens have been brought in under the impression they were natives. It seems desirable to put some of these on record, as, apart from the purely botanical interest, the matter is of some importance, for a species that to-day may be represented by only two or three stray plants may to-morrow be a naturalised weed of considerable aggressiveness. Only the other day at the back of some Brisbane wharves I saw one or two plants of *Inula graveolens*—the stinkwort. This had not been seen before, so far as I know, in Queensland, but in the Southern States several thousands are spent almost yearly on its eradication.

ORDER LEGUMINOSÆ.

MEDICAGO MINIMA, Linn.

Lesser Medick Burr. Specimens were handed over to me by Mr. E. W. Bick, who stated that it was coming up here and there in the Brisbane Botanic Gardens. The plant is similar in growth to the common Medick burr (*M. denticulata*), but the pods (burrs) are smaller and the whole plant covered with silky hairs.

CASSIA TORA, Linn.

An annual glabrous undershrub. Leaves petiolate, 4-8 foliolate with a gland between or above the lowest pair of leaflets. Flowers few, in very short axillary racemes. Stamens 10; the anthers of the upper 3 imperfect. Pod linear, slender, curved, 4-6 in. long, 1½-2 lines broad.

A cosmopolitan tropical plant. Mr. H. G. Ladbrook, Johnstone River, writes (19/7/17)—"Was introduced as a green manure, and now grows on roadsides, emitting from leaves, &c., an offensive smell." Some naturalised species of Cassia are amongst our most prevalent weeds.

ORDER ASCLEPIADEÆ.

CRYPTOSTEGIA GRANDIFLORA, R. Br.

Madagascar rubber. This well-known garden plant has firmly established itself as a weed in certain parts of Northern Queensland. In forwarding specimens for identification, Mr. A. C. Stevens, acting land commissioner, Rockhampton, wrote (25/9/17)—"I beg to report that yesterday, at the request of Mr. Mackellar, I visited the Rifle Range at

North Rockhampton to see the growth of a vine-like bush or plant known as 'Madagascar Rubber.' The plant has a strong tap-root and is hard to pull up, but could probably be eradicated by grubbing. It is now fairly thick on parts of the Rifle Range, and if not destroyed the whole reserve will become infested in a short time. I understand that this plant has only recently made it appearance on this reserve, though it has been growing in other parts of the town for some years. I have noticed that when growing among timber it grows like a vine to a considerable length, supported by the tops of trees.'' It is very abundant about Townsville, and is also very common on the Gilbert River.

ORDER BIGNONIACEÆ.

TECOMA CAPENSIS, Lindl.

This well-known South African plant, so common in Queensland gardens, is found here and there in the scrubs about Brisbane. It is to be found growing along Ithaca and Enoggera Creeks, and specimens have been brought in to me by Mr. W. Macmillan from the head waters of the latter. In the open it is of shrubby growth, but, when growing in the scrub, climbs up the trees to a considerable extent.

ORDER SOLANACEÆ.

SOLANUM SEAFORTHIANUM, Andr.

When collecting along Woogaroo Creek recently with my friend, Mr. H. A. Longman, we found several plants of this climbing Solanum growing in the heart of the scrub, the seed evidently having been carried by birds. It is very common in gardens, and is to be often seen about deserted homesteads.

ORDER LABIATEÆ.

MENTHA VIRIDIS, Linn.

Spearmint or common garden mint. Found growing as a stray along several of the creeks at Tambourine Mountain, Southern Queensland (*Longman* and *White,* February, 1917).''

CHANGING THE COLOUR OF HYDRANGEAS.

There are several methods of turning hydrangeas from their ordinary pink colour to blue, but they all require time. Here is one method which should not fail to effect the object in view. The plants must be prepared a year in advance of flowering, and all traces of the old soil, in which they have grown, removed. Pot the plants in peat, adding two-fifths leaf mould and one-fifth sand, 10 per cent. of powdered slates, 3 per cent. sulphate of iron—or a larger quantity of iron alum—and 10 per cent. of ammonium sulphate. Lime should not be used, and it is necessary to employ rainwater for the roots. Water the plants during the growing period with water containing ¼ oz. of sulphate of iron to the gallon.—''Farmers' Advocate,'' Durban.

Viticulture.

THE MILITARY IMPORTANCE OF WINE.

Several articles on Viticulture and the wine industry in Australia have been published in this Journal during the year. The writer of these articles, Mr. G. A. Gattino, struck a good note in his paper (May, 1917) entitled "Viticulture and the Wine Industry after the War," in which he wrote—"Wine is to-day a real necessity to all fighters. Wine raises the morale of the fighters, dissipates their sad thoughts, and comforts the soul. Wine is necessary to recoup their enormous loss of energy, when the nervous system is under such tension that it can only be imagined by those in the firing line."

The following article on the military importance of wine appeared lately in a South Australian publication (October, 1917), "Garden and Field," which bears out Mr. Gattino's contention, that wine (not spirits) is a necessity for soldiers:—

"It is perhaps safe to say that scarcely at any period in the past has a vintage been awaited with greater anxiety on all sides by the populations of the principal winegrowing countries of Europe, both from the commercial point of view, on account of the failure of last year's vintage, and from the military standpoint, by reason of the imperative necessity for a bountiful supply of natural red wine for the fighting forces of our allies.

"In proof of this it may be stated that France has already requisitioned for her military needs the astonishing total of some 200,000,000 gallons of this year's wine (representing one-fifth of her own entire annual production) as well as more than 40,000,000 gallons from her Algerian colony, and storage has already been arranged for this enormous volume of wine, representing in value no less than £20,000,000 sterling, by the taking over of special warehouse accommodation in every department of France.

"So essential is the regular supply of pure wine considered for the well-being of the troops that similar exceptional precautions are being taken to safeguard the crop in Italy, not only for her soldiers at the front but also for their sick and wounded comrades in the hospitals. That these early steps in protection of this year's produce of wine for military uses in the respective countries should be deemed necessary is the more remarkable in face of the fact that this vintage, though not abnormally abundant, has proved to be a full average one at least in all the more southern countries of Europe; and, further, that while France will have for her own consumption the large quantity of her wines that formerly went to Germany, Italy will likewise retain within her own borders that large proportion of her vinous products which in pre-war times found a ready outlet in Germany, and to a much smaller extent in Austria-Hungary."

Apiculture.

PRODUCING SALEABLE HONEY.

By ARTHUR C. MILLER.

It is easy enough to "keep bees," but to make them pay is a different matter. About the first bit of instruction given to the novice is to get his colonies strong as early as possible, and as most of the instructions have been written by beekeepers in the regions where clover affords the main yield, the instructions have all centered on securing that crop. But there are vast regions where clover is not the main crop and other regions where it does not grow, and where to work to get the colonies strong, early, is labour wasted. To meet with the greatest success the colonies should be strongest when the most desirable flow comes, be it early or late. Langstroth used to say: "Keep your colonies strong," and taken intelligently his advice is right.

There are many ways of doing it; so many that they are confusing to the average beekeeper. The prime requisite is a young and vigorous queen of a good strain, and the secondary is good combs. Given these and not too much manipulation the colonies will be ready when the flowers are.

Different sections produce different honeys—some fine, some good, and some indifferent or poor; so the first thing for the would-be successful honey-producer to do is to find out at what season the good honeys are secured. This is easily done by sampling the new honey whenever the bees are storing a surplus and tracing the bees to the flowers whence they get it. It is often quite as important to learn when the poor honey is gathered in order that the good may be secured separately from it.

When it comes to determining what honey is "good" many beekeepers will find themselves decidedly puzzled. They think one good while other persons do not like it. One palate is pleased with a strong flavoured honey; another wants something almost flavourless—just merely sweet.

In most regions good honey is secured from several sources, some, perhaps, coming early in the season, others late, and not infrequently poor honey coming in between. Perhaps the beekeeper does not secure enough of any one kind to supply his customers on one sort, and later gives them of the later crop only to have fault found because the honey tastes differently. The remedy is to hold all of the honey until the end of the season and then "blend" it.

No fixed rules can be given for blending. The proper proportions will have to be determined by experiment. Keep trying until it seems right, then "try it on the dog," which is to say, pass samples of the blend around among people and get their opinion. Eventually a combination will be secured which fits the palate of the community.

It sometimes happens that all the honeys of a region are too strong in flavour to be pleasing for steady consumption, and then it is necessary to buy a mild honey from some other region and soften the flavour by blending the strong with it.

The above advice will be understood to refer to extracted honey. This form of honey is steadily crowding out comb honey, and for several reasons. First, successful production of comb honey calls for more skillful beekeeping; secondly, it calls for a location where the honey flow is rapid and profuse; and, thirdly, it calls for more pains and care in preparation for market and in delivery than the average beekeeper seems able to give it. Also, many consumers do not like the wax and want the honey so that it can be used as syrups are used.

But even in locations where the honey flows are not conducive to successful production of comb honey on an extensive scale it is often possible to secure some choice comb honey which commands fancy prices.

The writer has proved the value of the advice above given. He has developed a blend of honeys which seems perfectly adapted to the local market. It is liked; repeat orders and new customers are the order of the day, and the honey sells for 20 per cent. more than any other honey on the market. And yet the region where it is produced is not considered a good honey section. As a whole it is not, but some parts of it at some seasons of the year give honey of exceptionally fine flavour, some of them a trifle too pronounced for steady eating, but ideal when used in the right proportion in a blend.

And in a few sections he secures a modest yield of comb honey from each hive, but this honey is a natural blend, the bees getting it from three or four sources at the same time, and the quality is so fine that it commands a very high price and is all engaged a year in advance. It pays to go to a lot of trouble to secure it, and even the modest per-colony yield returns in cash much more than the large per-colony yields of some other sections.

Study the honeys of your neighbourhood and work your colonies to secure all they can of the best.

Providence, Rhode Island, U.S.A.

WHITEWASH FROM PRICKLY-PEAR.

In certain parts of Uruguay the farm buildings are a fine white colour even during the wet season. To obtain this appearance a whitewash is used, made of the sliced leaves of the prickly-pear, which, when macerated in water for twenty-four hours produce a solution of creamy consistence. To this lime is added and well mixed in. When the solution is applied to any surface, be it wood, iron, or other material, a beautiful pearly white appearance is produced which endures through rain and frost for many years. The editor of the "Cyprus Agricultural Journal" says that the solution has been tested in Cyprus with good results. It may be noted that this use of the prickly-pear is common in the West Indies.—"Agricultural News," Barbados.

Entomology.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following notes from the Entomologist, Dr. J. F. Illingworth, upon investigations of the grub pest:—

Though this is the slack season in the activities of the grubs, we have been very busy in framing up our lines for attack, when they do become active again. The following list will not only serve to illustrate the comprehensiveness of these lines, but it will also indicate clearly the necessity for considerable additional assistance, if they are to be soon carried out. This assistance will be referred to again later:—

1. A study of the distribution of species with relation to soil, timber, cultural methods, &c.

2. Mapping of infested and non-infested regions.

3. Morphological study of reproductive organs of beetles, with relation to the period of ovipositing and the number of eggs produced.

4. Morphological study of the fungous parasites.

5. Breeding of the various local parasitic and predaceous insects in cages.

6. Introduction and breeding of beetle parasites from other countries.

7. Experimental methods for the rapid multiplication and wide distribution of our fungous parasites.

8. Introduction of bacterial and fungous enemies of the beetles from other countries.

9. A further study of various light-traps for the beetles.

10. A further study of repellents.

11. Field and laboratory experiments in the use of poisons for the grubs.

12. Field experiments to determine the relation of fertilisers to resistance; using green manure, stable manure, meatworks, nitrate of soda, &c.

13. A study of the effect of trash left on the field during the period of ovipositing of the beetles.

14. Also, having the ground covered with Mauritius beans during this period—planting cane in March.

15. Another experiment: Working the fallow soil during January and February and planting in March.

16. Experiments in late planting: Using plots planted in November and December, which are to be worked through the period of ovipositing.

17. Experiments to determine how far the beetles fly.

18. A study of varieties of cane best suited to grub resistance.

19. Experiments showing the value of lime on grub-infested soil.

20. Development of a general reference collection in the laboratory.

This list might be considerably extended; but, since several of the topics are so important that we might profitably occupy all of our time with one of them, it would appear best not to make the list too far-reaching. It is hoped, however, that we may soon have the assistance of students, who, while they are carrying out investigations along these various lines, will be gaining in practical experience and power, which will inevitably prove of great worth, both to the State and to themselves. Pests of tropical crops are omnipresent, and the call for trained men to cope with them will ever be insistent. Certainly, the expenditure for the permanent equipment of our new Experiment Station could not be put to better use.

Some recent observations that will prove of interest: Beetles were found, fully developed, in the soil at Greenhills, 24th July. These were in the hardest kind of soil, over 2 ft. from the surface, where they must wait for the rains to penetrate to them before they can emerge. It is very probable that a number of these must succumb if the rains are long delayed. Along the line of our investigations of the relation of humus to grub infestation, I learned, at Deral, that the grubs had been so abundant that a child picked up at the rate of about 8 lb. of grubs in a day; and still the cane showed no injury from them. The river-bottom land of that locality is exceedingly rich in humus, having been recently cleared from the scrub, and is subject to overflows.

MUSHROOM KETCHUP.

Put the mushrooms, fully opened or large buttons, into a pan, breaking them in pieces. Strew salt over them; let them stand for four or five days; then mash them and squeeze them through a cloth; boil and skim the liquor; throw in black and red pepper, a little ginger, and some eschalot. Boil all together, and, when cold, bottle.

General Notes.

SOCIETIES.

Elimbah.—Elimbah Farmers and Settlers' Progress Association. H. L. Hall, secretary.

ALGAROBA OR CAROB SEED.

We have received several inquiries concerning algaroba seed. We believe that there are some trees already bearing in Queensland, and would be glad to hear from growers if they have any seeds for disposal, as there appears to be a growing demand for them.

CURING HAMS.

As soon as the hams are cut, tie them up by the hock for three days. Then make a pickle thus: 1 oz. of saltpetre, 8 lb. coarse sugar, ½ oz. salt prunella, 8 lb. common salt, 1 oz. juniper berries, and 1 gallon of strong beer. Boil all together, and when cold pour it over the hams. Turn them every day for a fortnight. This pickle is sufficient for two hams.

Answers to Correspondents.

Louis Hoey, Brandon, Townsville—

FERTILISING INGREDIENTS REMOVED FROM AN ACRE OF LAND BY A 30-TON CANE CROP.

1. What proportion of nitrogen, potash, phosphoric acid, and water would be removed from an acre of land from which 30 tons of cane have been harvested?—*Answer:* The amounts of fertilising ingredients vary according to locality and cane variety. A 30-ton crop of D 1135 removed per acre in lbs.—

	Trash. Lb.	Top. Lb.	Crushable Cane. Lb.
Nitrogen	40 ..	33 ..	64
Potash	15 ..	44 ..	25
Phosphoric acid ..	7 ..	10 ..	23

2. Plans of modern farm buildings—milksheds, dairy, piggeries, and poultry-yards—have been forwarded as requested.

3. For roofing: Ruberoid or, if timber is plentiful, ironbark or pine shingles. Split shingles are preferable to sawn, as the former will not warp. Ironbark shingles discolour the rain water for a considerable time.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1917.

Article.		OCTOBER. Prices.
Bacon	lb.	9½d. to 10d.
Barley	bush.	2s. to 5s. 6d.
Bran	ton	£6 3s.
Broom Millet	„	£20 to £25
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£4 to £6
Chaff, Oaten	„	£7 to £7 10s.
Chaff, Lucerne	„	£5 to £6
Chaff, Wheaten	„	£3 15s. to £4
Cheese	lb.	9½d. to 10d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£6 15s. to £7 15s.
Hay, Lucerne	„	£4 to £4 10s.
Honey	lb.	5d.
Maize	bush.	3s. 9d. to 3s. 10d.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£23 to £24
Peanuts	lb.	5d. to 6d.
Pollard	ton	£7
Potatoes	„	£13 10s. to £19 10s.
Potatoes (Sweet)	cwt.	2s. to 3s.
Pumpkins (Cattle)	ton	£5
Eggs	doz.	7d. to 9d.
Fowls	per pair	4s. to 6s. 3d.
Ducks, English	„	4s. to 4s. 6d.
Ducks, Muscovy	„	5s. to 7s. 6d.
Geese	„	7s. to 8s.
Turkeys (Hens)	„	9s. to 11s.
Turkeys (Gobblers)	„	15s. to 20s.
Wheat	bush.	3s. 6d. to 4s. 9d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	6s. to 10s.
Cabbages, per dozen	1s. to 3s.
Cauliflowers, per sack	3s. to 5s.
Celery, per bundle	...
Beans, per sugar bag	6s. to 12s.
Peas, per sugar bag	7s. to 12s.
Carrots, per dozen bunches	1s. 5d. to 1s. 6d.
Beetroot, per dozen bunches	9d. to 1s.
Lettuce, per dozen	1s. to 2s.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per cwt.	2s. 6d. to 2s. 9d.
Table Pumpkins, per dozen	7s. to 8s.
Marrows, per dozen	1s. 6d. to 7s.
Rhubarb, per dozen bundles	...
Tomatoes, per case	5s. to 12s.
Cucumbers, per case	9s. to 10s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	OCTOBER. Prices.
Bananas (Queensland), per crate	10s. to 11s.
Bananas (Tweed River), per case	...
Bananas (Fiji), per case	10s. to 14s.
Bananas (G.M.), per bunch	...
Bananas (G.M.), per case	...
Guavas, per case	...
Lemons (Local), per case	4s. to 10s.
Mandarins, per case	6s. to 12s.
Mangoes, per case	10s. to 12s.
Oranges (Navel), per case	14s. to 16s.
Oranges (Seville), per bushel-case	7s.
Oranges (other), per case	11s. 8d.
Papaw Apples, per half-bushel-case	8s. to 12s.
Passion Fruit, per half-case	8s. 5d. to 9s. 5d.
Pineapples (Queens), per double-case	7s. to 10s.
Pineapples (Ripleys), per double-case	6s. to 8s.
Pineapples (Common), per double-case	6s. to 8s.
Tomatoes (Queensland), per half-bushel-case	6s. to 8s.
Cucumbers, per bushel	7s. to 9s.
Strawberries (Queensland), per tray	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	OCTOBER. Prices.
Apples, Eating, per bushel-case	21s. to 24s.
Apples, Cooking, per bushel-case	18s. to 20s.
Bananas (Cavendish), per dozen	1d. to 4½d.
Bananas (Sugar), per dozen	1d. to 4½d.
Cape Gooseberries, per quarter-case	8s. to 10s.
Citrons, per hundredweight	11s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	4s. to 5s.
Custard Apples, per tray	...
Lemons (Lisbon), per case	6s. to 7s.
Limes, per tray	...
Mandarins, per case	3s. to 9s.
Mangoes, per case	4s. to 9s.
Oranges (Navel), per case	12s. to 12s. 9d.
Oranges (Seville), per hundredweight	3s. 6d. to 10s.
Oranges (other), per case	6s. to 8s.
Papaw Apples, per quarter-case	1s. to 2s. 3d.
Passion Fruit, per quarter-case	10s. to 13s. 6d.
Pears, per quarter-case	19s. to 21s.
Peanuts, per lb.	5d. to 6d.
Persimmons, per quarter-case	...
Pineapples (Ripleys), per dozen	1s. 6d. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 5d.
Strawberries, per tray	1s. to 3s. 6d.
Tomatoes, per case	5s. to 12s.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1917.

Animal.	SEPTEMBER. Prices.
Bullocks	£26 10s. to £29 5s.
Bullocks (Single)	...
Cows	£14 7s. 6d. to £18
Merino Wethers	53s. 9d.
Crossbred Wethers	41s. 9d.
Merino Ewes	14s. 3d.
Crossbred Ewes	33s. 9d.
Lambs	43s. 3d.
Pigs (Porkers)	66s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, 1917, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1917.	Sept., 1916.		Sept.	No. of Years' Records.	Sept., 1917.	Sept., 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·54	15	0·48	2·05					
Cairns	1·65	34	1·00	4·50	Nambour	2·28	20	5·30	5·06
Cardwell	1·44	44	1·12	2·36	Nanango	1·83	34	7·11	2·98
Cooktown	0·56	40	0·12	1·47	Rockhampton ...	1·35	29	3·68	0·92
Herberton	0·46	29	0·02	1·42	Woodford	2·12	29	4·14	3·77
Ingham	1·09	24	1·25	0·75					
Innisfail	3·58	35	2·51	6·49					
Mossman	1·34	5	1·18	3·36	*Darling Downs.*				
Townsville	0·81	45	0·23	0·03					
					Dalby	1·78	46	5·82	0·87
					Emu Vale	1·79	20	4·51	2·25
Central Coast.					Jimbour	1·62	28	6·58	0·50
					Miles	1·41	31	5·92	0·45
Ayr	1·79	29	0 22	0·19	Stanthorpe ...	2·47	43	7·28	1·80
Bowen	0 87	45	0·18	0·84	Toowoomba ...	2·19	44	6·62	3·63
Charters Towers ...	0·85	34	0 71	0·03	Warwick	1·88	29	6·90	1·32
Mackay	1·59	45	0·70	0·11					
Proserpine	2·15	13	1·45	3·32					
St. Lawrence ...	1·38	45	2·59	0·27	*Maranoa.*				
					Roma	1·54	42	7·07	0·77
South Coast.									
					State Farms, &c.				
Biggenden	1·66	17	7·02	2·34					
Bundaberg	1·81	33	3 54	4 23	Bungeworgorai ...	..	...	...	0·77
Brisbane	2·09	66	5·21	2·81	Gatton College ...	1·54	17	7·50	1·84
Childers	1·98	21	3·98	3·24	Gindie	0·85	17	3·57	0·06
Crohamhurst ...	2·53	25	5·81	5·18	Hermitage ...	1·45	10	6·56	1·54
Esk	2·26	29	7·16	2·85	Kairi	1·07	4	0·66	1·76
Gayndah	1·58	45	5·28	1·46	Kamerunga ...	1·13	26	0·70	4·44
Gympie	2·10	46	3·57	4·03	Sugar Experiment Station, Mackay	1·49	19	0·60	0·44
Glasshouse M'tains	1·71	8	5·60	3·13	Warren	0·93	5	3·70	0·53
Kilkivan	1·75	37	4·17	1·69					
Maryborough ...	1·94	45	3·63	3·81					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON

1917.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·2	5·34	5·29	5·47	4·59	6·5	4·46	6·28
2	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·0	5·35	5·27	5·48	4·58	6·7	4·46	6·29
4	5·59	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·58	5·36	5·25	5·49	4·57	6·8	4·46	6·31
6	5·57	5·36	5·24	5·50	4·56	6·9	4·46	6·32
7	5·55	5·36	5·23	5·50	4·55	6·9	4·46	6·32
8	5·54	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·53	5·37	5·20	5·51	4·54	6·11	4·47	6 33
10	5·52	5·38	5·19	5·52	4·53	6·11	4·47	6·34
11	5·51	5·38	5·18	5·52	4·52	6·12	4·47	6 34
12	5·50	5·39	5·17	5·53	4·52	6·13	4·47	6·35
13	5·49	5·39	5·16	5·53	4·51	6·14	4·47	6·35
14	5·48	5·40	5·15	5·54	4·51	6·15	4·48	6·36
15	5·47	5·40	5.14	5·54	4·50	6·16	4·48	6·36
16	5·45	5·41	5·13	5·55	4·50	6·17	4·48	6·37
17	5·44	5·41	5·12	5·55	4·49	6·18	4·48	6·38
18	5·43	5·42	5·11	5·56	4·49	6·19	4·49	6·39
19	5·42	5·42	5·10	5·56	4·48	6·19	4·49	6·40
20	5·41	5·42	5.9	5·57	4·48	6·20	4·50	6·40
21	5·40	5·43	5·8	5·57	4·47	6·21	4·50	6·41
22	5·39	5·43	5·7	5·58	4·47	6·22	4·51	6·42
23	5·37	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·36	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·35	5·45	5·4	6·0	4·47	6·24	4·52	6·43
26	5·34	5·45	5·3	6·0	4·46	6·24	4·53	6·43
27	5·33	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·32	5·46	5·2	6·1	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·2	4·46	6·26	4·55	6·44
30	5·30	5·47	5·0	6·3	4·46	6·27	4·56	6·45
31	...	...	5·0	6·4	4·46	...	4·57	6·45

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
1 Sept.	○	Full Moon	10	28	p.m.
8 „	☽	Last Quarter	5	5	„
16 „	●	New Moon	8	28	„
24 „	☾	First Quarter	3	41	„

The Moon will be at its greatest distance from the earth at midnight on the 14th, and at its least distance on the night of the 30th.

1 Oct.	○	Full Moon	6	31	a.m.
8 „	☽	Last Quarter	6	14	p.m.
16 „	●	New Moon	12	41	„
24 „	☾	First Quarter	12	38	a.m.
30 „	○	Full Moon	4	19	p.m.

The moon will be furthest from the earth on the 12th, and nearest to it on the 28th.

7 Nov.	☽	Last Quarter	3	4	a.m.
15 „	●	New Moon	4	28	„
22 „	☾	First Quarter	8	29	„
29 „	○	Full Moon	4	41	„

The Moon will be furthest from the earth on the 9th, and nearest to it on the 24th.

7 Dec.	☽	Last Quarter	12	14	a.m.
14 „	●	New Moon	7	17	p.m.
21 „	☾	First Quarter	4	7	„
28 „	○	Full Moon	7	52	„

The Moon will cause an *Annular Eclipse* of the *Sun* on December 14th, but it will not be visible in Queensland. On the 28th there will be a *Total Eclipse* of the *Moon* between 7.38 and 7.55 p.m. It will be partly eclipsed for an hour and a-half before and after totality.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November, may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

RECRUITING.

ORGANISATION AND STAFF.

Federal.—Director-General of Recruiting: The Honourable Donald MacKinnon, M.L.A. Secretary: Captain W. A. Robinson.

States.—State recruiting committees, State organising secretaries. Federal electorate executive committees, local recruiting committees, recruiting officers, organisers.

STATE RECRUITING COMMITTEES.

A State recruiting committee in each State will be nominated by the Director-General of Recruiting.

The Director-General of Recruiting will correspond direct with them, and they with him, on general matters affecting the civil organisation.

These committees will exercise authority and supervision over all electorate and local committees, and will guide and direct the general policy to be adopted in this organisation of each particular State subject to the direction of the Director-General of Recruiting.

STATE ORGANISING SECRETARIES.

The State organising secretaries will act as secretaries to State committees and will be vested with the authority to carry out the directions of the State Committee. They will co-ordinate the military and civil organisations.

They will be given a free hand in all matters, other than financial, pertaining to general organising methods, subject to the direction of the Director-General of Recruiting and of the State Committee.

Recruiting officers in Federal electorates will be under the immediate control of the State organising secretaries.

Organisers attached to the staff of recruiting officers will be subject to the immediate control of such officers and will form part of the staff of the State recruiting committees, and will be appointed by such committees. State committees will, in a general way, advise and direct electorate committees in matters of policy and procedure.

State organising secretaries will certify, where necessary, to the payment of salaries, allowances, and expenses of recruiting officers, staffs. and local committees.

They will furnish progress reports at stated times to the Director-General of Recruiting.

FEDERAL ELECTORATE COMMITTEES.

The Federal Electorate Committee in each Federal electorate shall consist of seven members. The members of these committees will be appointed at a duly convened conference of three delegates from each local war service or recruiting committee.

The Federal member for the electorate will be ex officio chairman of this committee. Members of the Senate for each State shall be ex officio members of any committee or group of committees that may suit their convenience as indicated by them to the State Organising Secretary. All State members whose electorates are altogether or mainly within the Federal electorate will be also ex officio members of this committee.

A vice-chairman will be appointed in every instance.

LOCAL RECRUITING COMMITTEES.

Local recruiting committees shall be formed in each government area, and, if considered desirable, as in the case of shires, in towns within the shires which are centres of population, or in the case of metropolitan municipalities in the different wards or subdivisions.

The existing war service committees and local recruiting committees will be the basis of local organisation, provided that such committees agree to immediately call public meetings in conjunction with mayors and presidents, with a view to increasing their membership. The committees should be increased to the greatest extent, with power to add to their numbers. They might aim at embracing all men and women in their districts who are prepared to assist in endeavouring to win the war.

An executive committee of seven should be appointed by each local committee.

RECRUITING OFFICERS.

One or more recruiting officers, not necessarily holding military rank, will be stationed in a central town or towns in each Federal electorate.

One of such officers shall be the secretary and organiser to the Federal Electorate Committee in each electorate.

When a civilian is appointed a recruiting officer he shall receive a salary at the rate of £250 per annum, with travelling expenses, when absent from his head station, at the rate of 10s. per day.

Recruiting officers are to exclusively devote their attention to recruiting organisation, and must not engage in any occupation whilst holding this position.

The area officer in each training area will carry out his area duties independently of the recruiting officer, who may be stationed in the same locality. He must however, be always prepared to assist the recruiting officer when required, and should lose no opportunity of enrolling recruits, notifying the recruiting officer of the action taken, and making the necessary arrangements as to medical examination and transit through such recruiting officer.

ORGANISERS.

Organisers may be appointed in each Federal electorate, and these men should be suitable discharged returned soldiers appointed as civilians, civilians not eligible for active servce, or civilians who, having volunteered for active service, have been rejected.

They must be men of recognised organising ability.

All recruiting sergeants shall be immediately withdrawn and their appointments terminated.

Organisers will be paid £4 per week, and 10s. per day travelling expenses when absent from their head station.

FINANCIAL ARRANGEMENTS.

The salaries, allowances, and expenses of the Federal Secretary and State secretaries, recruiting officers, organisers, and staff shall be paid by the district paymaster of each military district.

Each State Recruiting Committee shall be provided with a fund to meet emergency and minor expenses of the compaign. The endorsement of the State Recruiting Committee, certified by the chairman or vice-chairman and secretary, will be a sufficient authority for the payment of all expenses.

A general financial instruction thereon will be issued by the finance member of the Military Board.

ENROLMENT AND MEDICAL EXAMINATION OF RECRUITS.

Recruits may enlist at any time, and at time of enlistment may specify any definite subsequent date to meet their convenience on which they will go into camp.

All recruits should be medically examined, A.I.F. standard, and such examination will be deemed to be final.

In cases where an A.M.C. doctor is not available, the recruiting officer will make the necessary arrangements for the recruit to be examined by the nearest Government Medical Officer, and, if passed by him as fit, the recruit will be provided with a rail, coach, or boat warrant to the nearest centre where an A.M.C. doctor is stationed.

Recruits passed as fit will be sworn in, after which leave will be granted until the date specified as the time when the recruit is prepared to enter camp.

A leave pass will be issued to the recruit. Such pass to show date of enlistment and the date when recruit is to report for the purpose of entering camp.

The State Committee in each military district must be notified of every enlistment. A notice of enlistment card must be prepared in duplicate in respect to each recruit in accordance with pro forma issued herewith. One copy shall be filed in the office of each recruiting officer and the other forwarded to the Organising Secretary of the State Recruiting Committee.

In addition thereto, notice of each enlistment will be forwarded to each local committee concerned.

Farm and Garden Notes for December.

Too much care can scarcely be bestowed upon potatoes dug up this month to protect them from the sun. They should be dug or ploughed out as soon as the skin is firm, as they are liable to rot in the ground owing to the great heat.

Field.—The wheat harvest will be now nearing completion, and to all appearance, while the results are not likely to contribute a record, owing to the dry spell in the early stages of the crop, still the subsequent seasonable rains effected a wonderful change in the young crops. Nevertheless, succeeding dry weather had a bad effect on the crop, consequently the yield of the coming harvest will be far short of that of 1916, being roughly estimated at about 1,750,000 bushels. The estimates of the probable yield have varied so considerably that it will be well to wait until the entire harvest is over before speculating on the result. This State is a long way from becoming a wheat-exporting country. The principal factor operating against a still greater extension of the wheat-growing industry is that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

Given favourable weather, maize, panicum, imphee, kafir corn, and the various millets may be sown.

Cotton sown in October and November will be making great headway, owing to the September and October rains. Keep down all weed growth by scarifying as long as the growth will admit of horse work. Tree cottons, such as Sea Island and Caravonica, should be topped and pruned.

Kitchen Garden.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Sow cabbage and cauliflower seed. Great difficulty will be experienced in getting these to grow at this season, and the plants will consequently be more valuable in proportion. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

Flower Garden.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light

with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry, keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit-fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.

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MELB. JOURNAL

Agriculture.

RICE-GROWING.

As there appears to be a recrudescence of the rice-growing industry in the North, the Department of Agriculture, in order to afford every facility for farmers to again take up this branch of agriculture, has purchased the ricemill, huller, and polisher which were worked successfully about the year 1909 by Mr. W. Heck, who owned a sugar-mill on Pimpama Island. The machinery was capable of turning out half a ton of dressed rice per day, and has been so well cared for that it is equal to doing as much good work as when first installed at Pimpama.

At Cairns, in times past, a good deal of rice was grown, and a ricemill was installed, which did good work, about the same year.

To-day Mr. Keane, Mareeba, is one of the rice-growers of the North, and Mr. N. A. R. Pollock, of Tolga, has also embarked in this industry.

The Department of Agriculture, being desirous of assisting any new industry giving promise of success, is sending the necessary machinery, on loan, for the benefit of prospective growers at and around Tolga, about 64 miles from Cairns. The Department has a large quantity of seed for distribution, all of the Mountain Rice variety, and incidentally for growers, from Cairns to Mareeba. At Mareeba, Mr. Keane has been very successful in rice-growing, and has distributed a quantity of paddy (seed rice) to his neighbours. This action of the Department should, and no doubt will, in the near future, result in an extended cultivation of rice. We have, in Queensland, not only the rice trade of the State to supply,

but also an excellent market for the product in British New Guinea, which annually imports large quantities of rice (Java-grown, or, at all events, not white-grown). This lucrative trade should be commandeered by Queensland, and, with our soil and climate, rice produced by white labour should be able to compete with that grown in black-labour countries.

Some years ago we published several articles on rice-growing, and this is an opportune time to give all possible information on the subject, since the Department has obtained the necessary machinery for turning out a marketable product equal, if not superior, to any imported grain.

We have pointed out that if the farmers of Queensland would take up rice-growing in earnest, there is a large market awaiting them in Papua. In corroboration of this, we find in the "Papuan Courier," 31st August, the following statement as to the rice shortage in Samarai:—

"There has been a shortage of rice here for some time, and the position became more acute on account of the southern steamer cutting out a trip. It was expected that this would be relieved by the arrival of the 'Wakefield' with a consignment, but unfortunately she brought no rice at all for Samarai. Owing to the urgency of the matter it was deemed advisable to send the 'Wakefield' straight back to Port Moresby, to bring along a shipment, and she left here on Monday morning with that purpose."

Why should there be any shortage of rice in Papua, when there are districts which we ourselves have visited, all along the southern and south-eastern coasts of the Territory, eminently adapted to the growth of Upland rice? and, furthermore, this country is so well watered that swamp rice could well be produced provided sufficient native labour could be relied on. It would well pay Queensland farmers to grow rice for sale in Papua, with benefit to that country, in the matter of freight charges alone. There are scarcely any tropical products such as coffee, tobacco, vanilla, cocoa, cotton, spices, rubber, &c., which cannot be profitably grown in that country. Tea, also, should succeed well in the mountainous districts, especially at Sogeri.

In September, 1909, Mr. F. W. Peek, Loganholme, wrote a paper on rice-growing which may be considered a good text-book for present-day growers. Mr. Peek's paper, which we reprint, dealt with rice-growing in the Logan district, but it is equally applicable to the Cairns, Mareeba, Tolga, Youngaburra, and other agricultural districts in that part of Queensland.

Many people are possessed with the idea that rice can only be grown in tropical swamps. This is too common an error. Large areas of the State are eminently adapted to rice culture, and very paying returns have been received—especially at Cairns, in the North, and in the Southern coast districts—by those who cultivated what is known as Upland or Mountain rice. There is no more trouble in growing rice than in growing wheat. Swamps and irrigation canals are not wanted. The land can be ploughed and prepared as for wheat, and the crop harvested in the same manner.

Here follows Mr. Peek's paper, which is as applicable to rice-growing to-day as when written in 1909, entitled—

RICE-GROWING IN THE LOGAN DISTRICT, AND ITS PREPARATION FOR MARKET.

Introduction and Early Cultivation.

In writing up this article (by special request), I will endeavour to make the information contained as intelligible as possible to the ordinary farmer and agriculturist. Of the value of rice there can be no two expressions of opinion, as this cereal forms the chief food supply of over one-half of the entire human race, and certainly there is not another product or cereal that, commercially or economically, obtains the same value as rice.

The varieties of rice to be obtained from the various countries where rice forms one of the staple crops for food supply, are innumerable, running into several hundred varieties, particularly where it is grown largely, as in India, China, Japan, Siam, West Indies, and in other parts of the world, and it has been found that local names have been given to rice of the same variety and quality. For general purposes and distinction, rice has been classified into three distinct varieties or classes. These are known to us as the "Aus," or upland rice; the "Aman," or swamp rice; and the "Boro," another swamp rice, or a variety requiring inundation, warm climate, and rapid growth, and producing a large coarse grain, but which, so far as I have been able to ascertain, has not been tried or cultivated in Queensland up to the present. The portion of the Logan district where rice was extensively cultivated is known as Pimpama Island, which is situated in the south-eastern portion of the State, in 153 degrees east longitude and between 27 and 28 degrees south latitude, and is approached from Brisbane by means of the South Coast Railway, one of the prettiest views in the Logan district, dotted from base to summit with its settlers' homes and splendidly laid out farms. The dark-green patches of sugar-cane, bananas, maize, and other crops, strongly contrasting with the rich red volcanic soil visible here and there, make a picture of agricultural industry both pleasing and effective, and one of which the district is justly proud.

What is known as " Pimpama Island " is the land lying between the Logan, Albert, and Pimpama Rivers, which are connected by a series of creeks and swamps with a long frontage to the Pacific Ocean or Moreton Bay, containing several thousand acres of rich coastal land, interspersed with large areas of ti-tree swamps, the water of which is brackish and undrinkable. The soil cultivated, and which has proved itself best adapted to the growth of rice, is of a sandy, loamy nature in appearance, but containing in a remarkable degree the constituents most suited to the nature and requirements of the plant, being easy of working, although slightly tenacious in wet or showery weather, but of very shallow depth in some places. Layers of decomposed marine shells are found in rather large quantities, pointing out that the lands were once ocean-washed, and the receding waters have left valuable deposits of lime and other constituents in the soil, which, together with the rich humus formed by

the decaying foliage of scrub vines, palms, ferns, &c., of rank tropical growth, have left these patches of soil of varying area between the swamps most suitable for rice culture.

The value of the land averages from £2 10s. to £6 per acre without improvement, and very little, if any, remains unalienated, it being so close to Brisbane, and the Logan district being one of the first settled districts of the colony, all the best lands were early availed of for cultivation. Who first introduced the rice seed of commercial value to Queensland appears to be undecided; but our late State Botanist, Mr. F. M. Bailey, has described a species of wild rice (*Oryza sativa*), a native plant of North Queensland, growing in the swampy lands there, as being

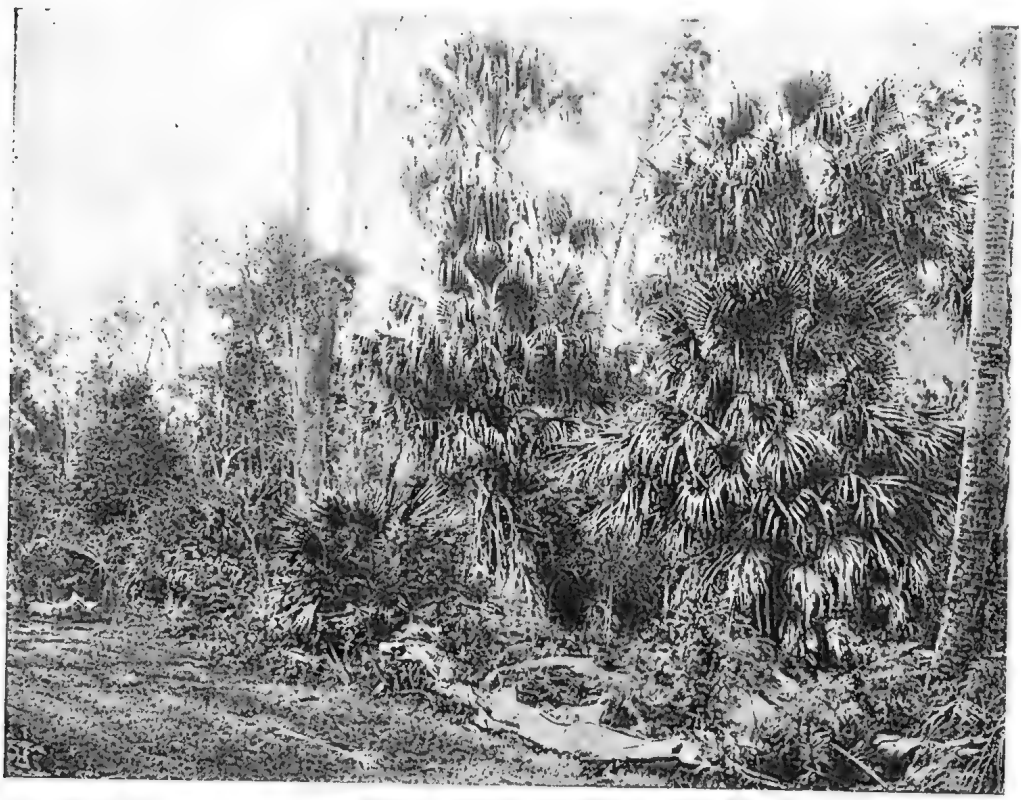

PLATE 34.—RICE LAND, PIMPAMA ISLAND.

indigenous to this State; also, the Chinese have grown rice rather extensively on the North Queensland river banks, particularly near Cairns, in patches for many years past, and which has met with a ready sale when placed on the market.

But it is to Mr. A. J. Boyd, the present editor of the "Queensland Agricultural Journal," that the credit is due of the introduction, in 1869, of rice-growing in the Logan district—he having procured the seed and planted it as an experimental crop at his sugar plantation, Ormeau, which he then had at Pimpama. The seed was one of the Japan varieties, with which he met fair success as regards the growth and result. Since that

time, from the seed Mr. Boyd raised and distributed, other settlers have taken up the matter of rice-growing at various times and in a fitful manner, the largest local planter some fifteen years ago being Claus Lahrs, an enterprising German settler, who planted at Pimpama Island two or three varieties of the China and Japan rices, but, owing to the seed not being tested or acclimatised, he met with but indifferent success. He even went so far as to incur the expense of erecting a mill for dressing the paddy (as rice in husk is termed), but after a few years he gave it up, partly because of the machinery, not being of the best description for dressing the rice, doing its work imperfectly, but also because the rice grown was not the best variety for table use or suitable for the home market. So the industry, so far as the manufacture was concerned, was allowed to lapse. The farmers since then have still kept on planting the rice, which they have cut and used for fodder for their horses and stock, using the seed saved from the crop reaped for re-sowing the land. The consequence has naturally been that the crop had deteriorated with successive plantings, through the same seed being used without change. But three things of great importance had been learned. These were: 1st. The suitability of the soil and climate of the Logan district for rice culture. 2nd. The proper time at which to sow the seed to ensure success. 3rd. The best system of planting and after-treatment of the crop. The value of rice has also been thoroughly tested as green feed for horses and stock, who eat it greedily and keep in splendid condition when fed upon it. The greatest difficulty in rice culture has been found in procuring the right seed, there being such a large variety of each kind, both with their distinctive flavour, colour, and quality, as well as in the facility with which the crop can be handled and harvested (as I will explain further on) and in the requirements of the merchant, who has his prejudices in favour of certain kinds, which more or less best suit the tastes of the consumer. This has now to a certain extent been overcome, and our farmers are now prepared to carry out this important branch of agricultural industry on sound business lines and with up-to-date methods.

PREPARING THE LAND.

Rice, like every other cereal and vegetable, to ensure good results, must have a certain amount of attention and care in preparing the land, although the question of drainage does not enter so largely into consideration as regards rice as with other cereals, and it, of course, greatly depends as to which variety of rice you intend to cultivate, but stagnant water should be avoided as detrimental. The variety I intend this article to illustrate is the Aus, or upland rice. I have tried the Aman variety as an experiment, but with small success, the chief fault of the latter being the necessity of it being submerged continuously with not less than 2 to 3 inches of water, and when the crop ripens, the difficulty of harvesting, owing to the grain being so brittle that at the least touch it leaves the ear with a consequent loss of seed. The variety of rice now grown most extensively in the Logan district is known as the "White Java," which gives a length of straw from 4 to 6 ft., with a good flag, besides a grain of good length, fairly plump, and good cropper, and, so

far, seems fairly free from disease or rust. Other varieties now being tried are the China, Kobe Japan, Batavia River, and Italian Upland, of which the White Java and the Italian Upland have been obtained through the medium of the Agricultural Department.

In preparing the land for planting, ordinary methods need only be adopted—that is, to first plough, leaving the soil to lie for a week or so, to aerate and sweeten; then crossplough and harrow, bringing the soil to as fine a tilth as possible. The best time in this district for planting (and I should think it a suitable time for all districts south of Rockhampton) is at the end of September or at the beginning of October, when we get the first rains. In cultivating for rice on hillsides or sloping land with a natural rapid drainage, it would be advantageous to slightly terrace the land crossways to the fall of the hill, leaving an open catchment drain on the higher side, blocked at each end to conserve the rain water, because even so-called upland rice must have a certain amount of moisture, and by the construction of the above drain, or dam so to speak, the gradual percolation of the conserved water will have the desired effect of helping to supply the necessary moisture, which would be about 20 to 30 in. of rainfall spread over the period of growth. This rainfall has produced very good crops of fair yielding grain.

SOWING THE SEED.

In sowing the seed we have to be determined as to our requirements —if for cropping for grain or for fodder purposes only. There are three systems: Broadcast chiefly for fodder purposes, planting in drills, and transplanting from nursery beds. In the first instance—*i.e.*, sowing broadcast—it will take a bushel (60 lb. of paddy)* to the acre, the seed being harrowed and treated in the same manner as oats or wheat in the after cultivation. But the plan most generally adopted, and by far the best, is planting the rice in drills 2 ft. 6 in. or 3 ft. apart, and about 10 to 12 in. between the plants, which may be done successfully with an automatic seeder. By this method, about 35 to 40 lb. seed to the acre are required. It ensures the crop being more even and not so patchy as when sown broadcast, and allows a better chance of going through the crop with hoe or cultivator to remove any weeds that may have made their appearance before the rice has got fairly started. The system of planting in nursery beds and transplanting out is adopted chiefly in planting swamp rice or the Aman variety; but, as this system of planting entails a lot of labour, I do not think it will ever come into active operation in this State. The mode of operations with this variety is briefly as follows:—Beds are prepared according to the area to be planted; a bed about 20 ft. long and 6 ft. wide will be amply large enough to grow plants for a quarter of an acre, the beds being well made and enriched, so as to produce vigorous plants. Sow the seed and rake in carefully, watering at certain intervals. Care must be taken to keep the plants growing. When the plants are about 6 in. high they are ready for transplanting to their permanent beds, which is done by making holes about 10 in. to 1 ft. apart in the rows and 2 ft. 6 in. between the

* Unhusked rice seed.

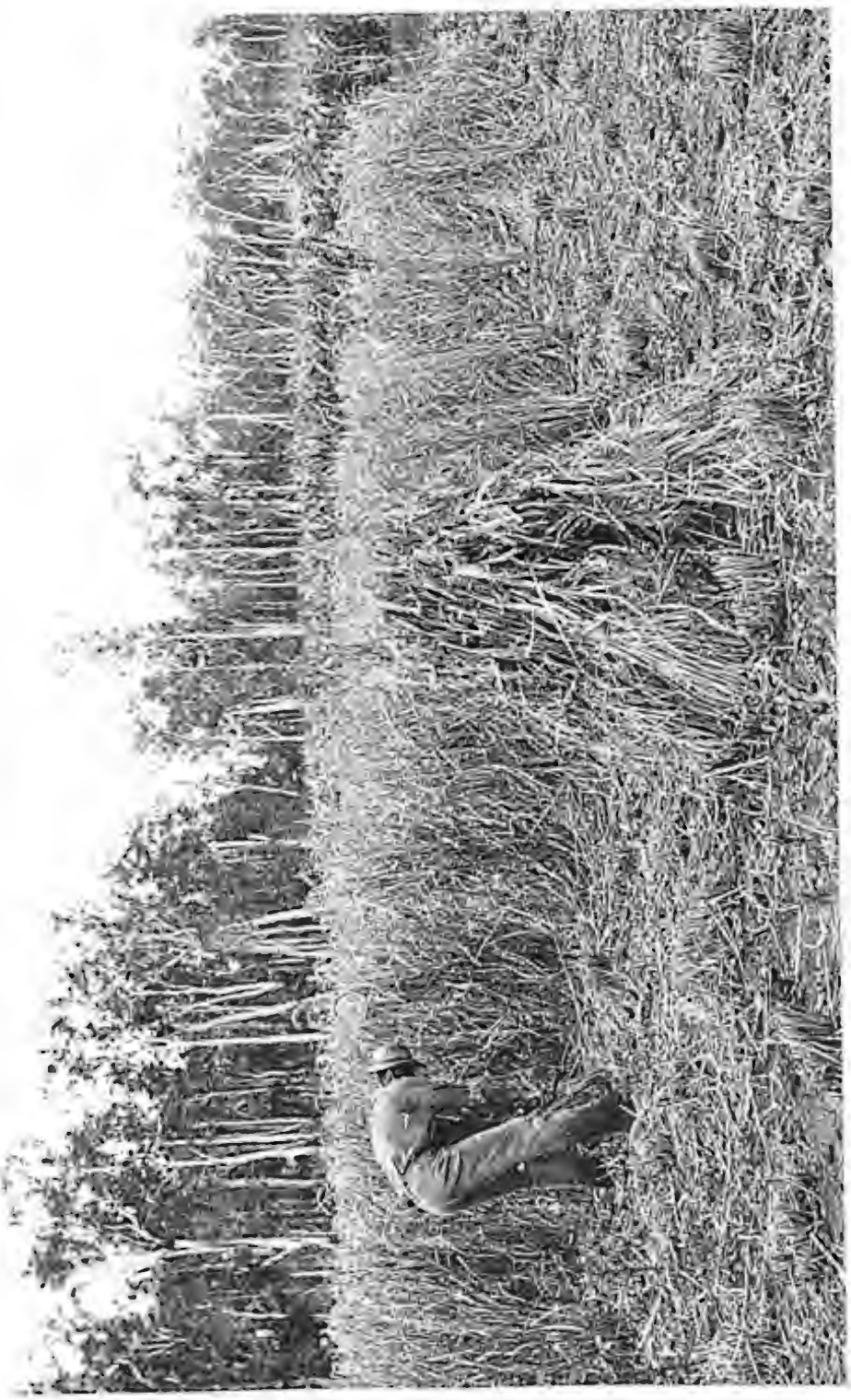

PLATE 35.—HARVESTING RICE.

rows. But, as before pointed out, this is a most tedious and costly mode of planting, and the labour involved is a serious item for consideration. You might as well try to transplant a field of oats or wheat, and expect to get a profit. So that it will be easily seen the planting in drills is at once the most economical and systematic, besides being the one most generally adopted.

HARVESTING THE CROP.

This was a difficult matter to undertake with the rice formerly planted in the Logan district, the China and some of the Japan varieties being so brittle that when ripe the least touch caused the grains to drop off with a consequent loss of seed. This has been happily overcome to a certain extent by the better variety planted. Not only does the White Java give better facility for harvesting, but the straw is of a better colour and quality, of a good length, averaging from 4 ft. to 5ft., and in good land even 6 ft. is no unusual length; and no more fairer or gratifying sight to the farmer's eyes can be imagined than the rich appearance of a rice field ready for harvesting: this is whilst the stalks have still a bronze-green appearance, the heads have turned a golden brown, about half-way down, and appear what a wheat farmer or an inexperienced person would deem three-parts ripe. The heads of rice, heavy with grain, have a graceful, drooping appearance; as many as thirty to forty heads have been produced from a single grain planted—the product weighing from 10 oz. to 14 oz. By cutting some varieties of rice in this state, the loss is not so great as with over-ripe grain. The cutting is begun in the morning as soon as the dew is off, the rice being bound up into very small bundles, ready to be threshed as soon as possible (which will be explained later on). Rice is never left stooked in the field, but is treated as quickly as possible.

The usual method pursued in harvesting is to cut with the ordinary sickle or reaping-hook, although where large areas are now being planted it is thought that the latest inventions of wheat-harvesting machinery could be used most effectively. A slight alteration in the reaper and binder might be required in the way of lighter and broader wheels on the rich soft rice lands, but otherwise I see no difficulty in harvesting. At all events, it is the intention of the writer to induce some firm to make a trial at next harvesting as an experiment, and if successful a machine will doubtless be obtained on co-operative lines for the use of the district. After cutting with the sickle, the rice is gathered into bundles and carted into the barn or shed, or, if not sufficiently dry, is left for a day or so to ripen; but this is not often the case, experience having taught our farmers the right time to cut, and it is generally taken to the barn at once for stripping or threshing.

THRESHING THE RICE.

Where there are large quantities, this can be done with the ordinary flail on a threshing-floor, but other system are in vogue where only small quantities are grown. One plan of threshing is by driving four forks into the ground, about 4 or 5 ft. apart in width and 10 or 12 ft. long, placing two long saplings lengthways and two crossways. Over these a

sheet or tarpaulin is placed to hang and form a sort of long trough. In the centre, resting on the cross pieces, a rough kind of ladder is placed, and the bundles of rice are then beaten over the bars of the ladder, which causes the grain to drop into the bag. Some farmers merely nail a few strips across a box or wooden trough, and beat the rice out on this by handfuls. After the grain is beaten from the straw (it is then known as paddy), the next operation is the winnowing. This is done in an ordinary sieve by letting the grain fall on to a sheet in a light breeze, the sieve being held up at a little distance; its weight causes the sound grain to fall on the sheet, whilst the light grain, bits of straw, &c., are wafted away to one side. The paddy is then carefully collected and placed in the sun, spread out for a few days to get thoroughly dry, when it is bagged and stowed away in a dry barn, or else taken away to the miller for turning into the article of trade and commerce with which we are more familiar, and known as rice and not paddy. The straw, after the grain is threshed out, is spread out to dry or cure, or else it is fed to the stock. A great deal of nutriment remains in the stalk at the time of threshing, and I believe it would make up into a splendid ensilage if desired to be used when other feed is scarce. I should be pleased to hear the results if any of our enterprising farmers will give it a trial.

Milling the Rice and Preparing the Crop for Market.

This is a most interesting operation, and for the want of the necessary machinery the rice industry has lain dormant for several years in the Logan district. Every credit must be given to Mr. F. W. Peek (the writer of this article) for the energy and enthusiasm he has displayed in reorganising the industry, and the farmers, through the medium of the Logan Farming and Industrial Association, who took the matter up, believing that a great benefit would result to the district if only carried out in a systematic manner. The matter was ably discussed at their meetings. The Agricultural Department was written to for advice, and their assistance was given as far as possible to facilitate the objects sought to be obtained. It was from information supplied by the Department that the farmers were induced to co-operate in the purchase of a new and better variety of seed, a quantity of White Java—900 lb.—being purchased and distributed at first cost among the farmers; next, a small experimental patch was started, the Department supplying rice seed of other varieties, which are now being tested for their producing and milling qualities, the seeds from this source being again redistributed free of charge to those willing to grow them and still further test the various kinds submitted.

With the large increase of area planted, the want of a mill began to make itself felt. The prices offered for Queensland-grown rice were very low, principally owing to no local mills in Southern Queensland being established at that time. Again, the Department of Agriculture was appealed to, and the address was obtained of the latest up-to-date firm of manufacturers of rice-milling machinery. This was the Engleburg Huller Co., of Syracuse, U.S.A., who were promptly written to for information, and price-lists and catalogues were received from them. A

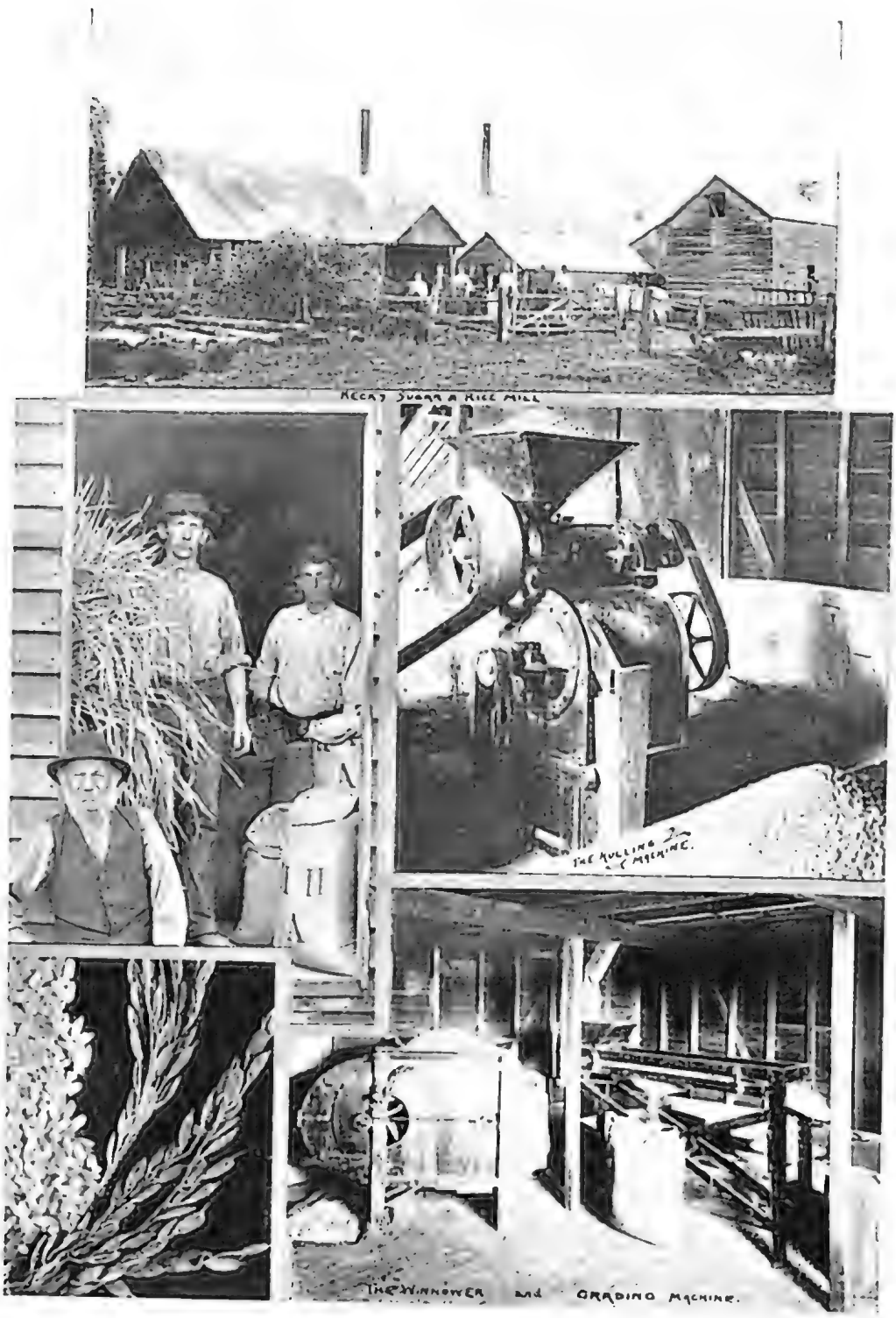

PLATE 36.—RICE MILL, PIMPAMA ISLAND.

meeting of the farmers was called, and an endeavour was made to get a co-operative mill, but without success, the general opinion being that growing and manufacture were two different branches of the business, and that milling would be better undertaken by a local sugar-miller, who would have the necessary engine-power to work the rice-mill at times when the sugar season was over. This was eventually the plan adopted. Mr. Wm. Heck, who owned a sugar-mill on Pimpama Island, sent for and erected the necessary buildings and machinery as an adjunct to the sugar-milling industry. A neat weatherboard structure, the dimensions being 28 ft. long, 18 ft. wide, and 22 ft. high (two story), was erected on stumps to keep the floors dry—an essential in ricemilling operations—a floor being placed about 10 ft. high from the basement floor and extending the full length of the building. Upon this floor is erected the Engleburg Huller and Polisher, a neat little machine known as the "No. 4 size," and capable of treating half-a-ton of dressed rice per day. The paddy, being run into the hopper of the machine, falls on to a cylinder which revolves at high speed and most effectually "hulls"—that is, rubs off the cuticle or outer skin—and polishes the grain in one operation. The pollard or residuum from the rice (hulling and polishing) falls on the floor, whilst the grain itself descends to the lower or basement story of the building by means of a shoot which conducts it into a machine placed to receive it, and known as a grader, which is worked and fed automatically from the machine above. There are four sieves or sifters in this grading machine which separate the broken grains, and also the polished rice into first, second, and third quality, the rice being caught in bags or boxes placed to receive it. It is then ordinarily ready for market, but Mr. Heck added another machine to his mill, known as an improved winnowing machine; this machine, by a series of cogs and cranks, makes the rice pass through another set of sieves, and, at the same time, the wind from a rotary fan contained in the machine and driven at a high velocity clears off any impurities of husk, dust, &c., that may be with the rice after leaving the grading machine, and completes the milling operations by finishing the product in a perfectly clean and highly polished state. Samples of this rice were exhibited at the last National Agricultural Society's Show in Brisbane, and submitted to experts, who expressed themselves as pleased at the improved samples displayed, which were equal to any imported rice of the same variety and very little different from the best Japan.

THE RICE CROP—WILL IT PAY?

This is the question invariably put to the writer whenever advocating the growing of rice as one of the crops to be successfully undertaken in the coastal districts of this State.

In the first place, take the cropping. In ordinary situations, with only fair cultivation, from 30 to 40 bushels of 60 lb. of paddy can be obtained per acre, which is double the wheat yield, the average crop of wheat being from 15 to 20 bushels per acre. I know in some instances these quantities have been exceeded in both crops, but I give a fair average for comparison. The value of wheat per bushel ranges from

3s. to 3s. 6d., whilst the value of rice sold to the local mill averages from 4s. to 5s. per bushel delivered at the mills. Then dry rice chaff is of great value as a feed for stock and horses, and I feel sure, if placed on the market and once fairly tested, it would command a ready sale. The straw is less hard, and, when well dried, compares favourably with oaten straw, and a fairly low estimate would give (according to variety grown) from 3 to 4 tons per acre, of an estimated value of £2 to £3 per ton, or an average to the grower per acre of straw and grain of £15 10s. per six months' crop. Of course, in favoured districts two crops can be obtained in the year—that is, where frosts do not appear. Then the above figures would have to be doubled as a yearly income, but, in the Logan district, only one crop of rice is taken, to be followed by a late crop of some other kind, such as oats, &c. Of course, the greatest benefit is derived by the grower on a large scale if he does his own milling. A glance at the prices paid for paddy and the prices now obtainable for the finished product will be worth consideration. Taking the current prices of rice, at the time of writing, in the Brisbane market, duty paid, best Japan is £24* per ton. The commonest quality of imported rice, "Rangoon," fetches, duty paid, £19. This price gives a fair margin of profit to the local miller if he sells at £18 per ton. The samples being milled this season at the Pimpama Island mill are of very high grade, and closely resemble "Patna" in shape of grain, but slightly darker in colour. Taking then the local rice at £18* per ton market value, to produce which 1 ton 10 cwt. of paddy would be required (according to records taken at recent trials) to be milled, of a value of £12 9s. 9d.; this would leave a margin of £5 10s. 3d. I will add here that paddy rice is bought locally like wheat at 2,240 lb. per ton, deducting the cost of milling, the average of about £2 per ton leaves the miller a net profit of £3 10s. 3d. per ton. To this must be added the value of the pollard, which also is of great value as feed for calves, pigs, or poultry, when steamed and then mixed with separator milk. Its commercial value is certainly not less than £2 to £3 per ton.

The following is taken from the Brisbane "Observer" of 29th June, 1901:—

"We were to-day shown a sample of rice grown at Pimpama Island, Moreton Bay. It resembles Patna rice in shape of grain, but is darker in colour. Qualified experts who have seen the sample say that it is the first really high-grade rice that they have seen grown in this State, and as it can be marketed at from £18 to £18 10s., should command a ready sale. The commonest quality of imported rice, Rangoon, fetches £19, duty paid, here just now, while for Japan rice £24, duty paid, is asked by the distributing houses."

The price quoted for the mill such as I have described, and which is so constructed that it can be duplicated or extended at a very small cost is, for the No. 4 machine, with a capacity of not less than half-a-ton per day, together with grader, &c., about £130, delivered at Brisbane. Of

* £29 to £30 in July, 1917. The figures as here given by Mr. Peek were those ruling in 1901.—ED.

Plate 37.—Head of Rice and Hulled Rice. (Natural Size.)

course, the buildings are extra, and the power required to drive the machinery; but worked in conjunction with any existing sugar-mill, or sawmill, &c., it would prove of great value to the district, and a source of profit on the outlay to any enterprising millowner.

FUTURE PROSPECTS OF THE RICE INDUSTRY.

Like all other crops, rice has its enemies and diseases; it has a kind of rust, smut, &c., and in some parts of Queensland grubs will take the roots, but up to the present the grub has not caused any trouble in the Logan district. The rust has yet to be dealt with, and I think this will be accomplished by experimenting with various kinds of rice seed till we meet with a rust-resisting variety. It is probable now that under Federation the importance of rice culture will receive the attention it is worth. A large sum of money is annually expended in importing the product into the Commonwealth States, I would therefore advise all farmers to give rice a fair trial, especially as we are growing varieties that can now be classed as fairly successful on our coast lands, and where a fair average rainfall can be partly depended upon. The value of rice grown simply as fodder to cut green is great for stock feed, the stalks being sweet, juicy, and succulent, and giving a good return per acre, and all stock will eat it with avidity. The question of labour does not enter largely into rice cultivation; as I have pointed out, although a tropical product, there is every facility for cultivation by present mechanical methods—that is as far as the Aus or upland rice is concerned; the Aman or Boro varieties being swamp rices needing irrigation I have not yet heard of as being grown to any great extent, and they probably will not be for some time, if at all, owing chiefly to the heavy outlay required for a suitable water supply and an irrigation plant, which can be dispensed with in growing the beforementioned varieties of upland rice, which have proved most suitable for existing conditions and our present agricultural methods of cultivation and harvesting. Of this I am certain, that the rice is one of our coming crops which, together with coffee, will prove of great benefit to this State particularly, and a further source of wealth to our producers. The market for rice in Australia is a growing one, and it will take years before the supply overtakes the demand. Our farmers need not fear to grow the crop and invest in this industry, which will return a fair amount of profit for the labour and outlay required to produce an article which only requires care in selecting and planting the varieties to suit the market requirements. I am sure the efforts of our producers will be crowned with success, and I shall be pleased with the part I have taken in assisting the modern development of rice cultivation in Queensland.

REGISTRAR-GENERAL'S STATISTICS OF RICE PRODUCTION AND IMPORTATIONS FOR THE YEAR 1899.

Total area planted in Queensland	319 acres
„ quantity produced (paddy)	9,275 bushels
„ average would equal clean rice ..	320,617 lb.
The net imports of rice for 1899 were ..	9,283,933 lb.
Of the value of	£50,099

The above figures represent the position as to production and consumption, and would therefore be about 3·34 per cent. of the total requirements of this State only.

RECORD OF RICE CROPS FROM 1898 TO 1916.

Year.	Acres.	Yield. Bushels.	Average per Acre. Bushels.
1898	863 ..	38,133 ..	44·19
1899	319 ..	9,275 ..	20·03
1900	271 ..	6,870 ..	25·35
1901	205 ..	5,222 ..	25·47
1902	38 ..	1,093 ..	28·76
(Average.—Cairns, 30·16; Cook, 31·50; Port Douglas, 33·84)			
1903	49 ..	1,322 ..	27
1904	60 ..	1,638 ..	27·30
1905	33 ..	885 ..	26·82
1906	24 ..	772 ..	32·17
1907	14 ..	763 ..	24·50
1908	7 ..	270 ..	38·57
1909	— ..	— ..	—
1910	2 ..	22 ..	11
1911	15 ..	402 ..	26·80
1912	1 ..	27 ..	27
1913	5 ..	118 ..	23·60
1914	3 ..	66 ..	22
1915	1 ..	23 ..	23
1916 No rice planted.			

The return for eighteen years amounted to 66,901 bushels, or 3,716 bushels per annum of Paddy (60 lb. per bushel), or about 95 tons, which, at £24 per ton, is £2,280. Yet the net imports of rice in one year alone were to the value of £50,099.

[The total annual production of rice in the United States of America, which, in 1866, was 2,000,000 lb., has now reached 350,000,000 lb. It will take 8,000 large railway cars to handle the crop this season. Rice lands have risen from £2 per acre to £8 per acre; hundreds of miles of irrigation canals have been constructed. Rice has been the redemption of the prairie lands of Texas and Louisiana. In ten years the worthless lands of these two States will produce the world's demand in rice. An acre there produces 20 sacks, worth from 10s. to 16s. per sack. Where are the Queensland farmers in the race?—Ed. "Q.A.J."]

Pastoral.

ERADICATION OF THE CATTLE TICK.

OBSERVATIONS ON THE EFFICACY OF THE TICK-DESTROYING MIXTURES APPROVED BY THE QUEENSLAND STOCK DEPARTMENT, ACCORDING TO THE METHOD AND THE THOROUGHNESS OF THEIR APPLICATION.

The Queensland Cattle Tick (*Rhipicephalus annulatus Australis*) is a one-host tick—viz., it spends the whole of its parasitic life, approximately twenty-one days, on one animal. Its life-history, according to Tryon, is briefly as follows:—

The large fully distended ticks, so easily seen on badly infested animals, are the female ticks that have completed their twenty-one days of parasitic life. They are engorged with blood and about to leave their host and fall to the ground. On dropping on the ground, these fully-developed ticks seek a sheltered spot, and will, under favourable weather conditions, commence to lay eggs in three days. This operation is completed in from ten to twenty-one days, and the number of eggs deposited varies from 1,500 to 3,000. Under favourable conditions as to temperature and moisture, such as usually obtain in the coastal areas of Queensland, the eggs hatch in from twenty-one to forty-two days, and each egg gives birth to a very small young tick, or larva as it is called. The larva is much smaller than a pin's head, is light-brown in colour, and has six legs. It crawls up such things as blades of grass, twigs of trees, posts of fences, &c., and can live there some months, but without a host it is unable to develop any further and will ultimately die. Should, however, a cow or other bovine happen to rub against the grass, twig, or post carrying the larval ticks, the latter will attach themselves to some part of the body of the animal, pierce the skin, and commence to feed on its blood. About seven days after the tick, as a larva, obtains access to and attaches itself to a cow it moults and develops into the second stage. It is then called a nymph, and has eight legs. After a further seven days as a nymph it again moults and reaches the adult stage, the male and female then being about the same size. Only seven more days are passed on the cow, and during this time the female ticks gradually increase in size, and for about twenty-four hours before leaving the host they engorge themselves enormously with blood, then drop to the ground, and seek a suitable sheltered spot in which to lay eggs.

If only a small number of larval ticks (say only ten) attach themselves to a cow, it will be very difficult, or in many cases impossible, to detect their presence at this stage, even though a most careful examination be made with the aid of a tooth-comb and magnifying lens. However, the importance and the danger of such a light and unobserved

tick infestation must not be overlooked, as if the infested cow is not immune she will will probably die of redwater before the ticks are sufficiently grown to be readily detected. On the other hand, if the cow should be immune from redwater she might be sold, and if not treated or only imperfectly treated with tick-destroying fluid the purchaser might travel her a long distance by rail, and so carry ticks into clean country. If only five fully engorged female ticks developed from the ten larval ticks, and these on leaving their host found a suitable nesting-place, and the conditions were favourable for hatching, they might account for the distribution of some 10,000 to 15,000 larval ticks capable of setting up redwater amongst other members of the herd into which the cow was introduced, and, in addition, set up a new centre of tick infestation.

By thoroughly treating tick-infested cattle with dipping fluids containing ·2 per cent. of arsenic (8 lb. of arsenic per 400 gallons of water containing emulsifying agents), it is possible to either completely destroy or prevent the further propagation of the ticks. To get the best results from this treatment, cattle should be forced to plunge into and swim through a dipping tank so that the whole body is completely immersed in the tick-destroying fluid.

Dipping in a ·2 per cent. solution of arsenic, in which some soap has been dissolved to render the mixture more adhesive, has now been practised in Queensland for about twenty years, and when properly carried out the results have been highly successful. It has been abundantly proved that the most grossly tick-infested cattle can be completely cleansed of ticks by two dippings in such a fluid carried out with an interval of seven days between such dippings, and if the cattle thus treated are not exposed to reinfection they may be safely travelled into clean country. Of late years there has been a tendency amongst cattlemen to over-estimate the tick-destroying effects of arsenical solutions, and many wrongly claim that a solution of arsenic in the proportion of 7 lb. to 400 gallons of water, and even that 6 lb. of arsenic to 400 gallons of water will effectively destroy all ticks at one dipping, while a few stockowners show keen disappointment when they are informed that their dips so charged cannot be accepted as efficient for the dipping of cattle travelling into clean country.

Again, others wrongly claim that, using a similar solution, careful application by spraying is as effectual as by dipping.

A third common error is to neglect having dip samples analysed and to rely on the following very unreliable method of testing the strength of the dipping fluid:—Immediately after dipping remove from the cattle three of four ticks and place them in an empty box or bottle. If the ticks die in from one to two days the dip is too strong; if the ticks take from three to five days to die, the dip is of correct strength; if they are not dead within five days the dip is too weak.

With the object of correcting these errors and showing the absolute necessity for the most careful preparation of dipping fluids in accordance with the Government formula and of the thorough application of

same by dipping, we will give a brief description of the work of eradicating ticks at the Stock Experiment Station, Townsville:—

A spraying crush was erected with an overhead tank. The fluid used was prepared from an approved commercial dipping concentrate in accordance with the instructions on the label. All the animals were carefully sprayed, such portions of the body as the inside of the ears, the brush, under the arms and flanks receiving special attention, and the operation was not hurried. Seven days after spraying the same cattle were yarded, and examination revealed the presence of live ticks, including many fully engorged female ticks. They were then sprayed a second time with the same fluid and inspected after a further period of seven days, when live and fully engorged female ticks were again discovered on them. The dipping fluid used in the first two trials was discarded and a fresh fluid prepared strictly in accordance with the Department's formula was tried. The cattle received their third spraying with this material, but on examination seven days later we again found them to be infested with a few fully engorged female ticks. Other concentrates were then used with equally unsatisfactory results. From this period onwards spraying was repeated at fourteen-day intervals, and for some months afterwards a few adult female ticks were discovered when the cattle were inspected immediately before being sprayed. After five months of such treatment, aided by burning of the pasture, ticks were seldom seen; and, although spraying was continued at fourteen-day intervals, no ticks might be observed on the cattle for a month or two. Still, on rare occasions, when examining an animal before spraying, one would find a few adult ticks. Some of these were doubless the result of accidental reinfestation, seeing that the property on one boundary is only separated from adjoining tick-infested land by a single line of fencing.

The following experiment will illustrate the usual result experienced by us from spraying tick-infested cattle:—

Three stud bulls from Warwick, in South Queensland, arrived at the Townsville Experiment Station on 20th April, 1916. On 1st May one bull was found to be tick-infested, consequently all three bulls were immediately sprayed. The fluid used in the spray contained arsenic in the proportion of 8·7 lb. to 400 gallons of water, with a very high wetting power. On 2nd May some fully engorged female ticks were removed from the infested bull; several duly laid eggs, which failed to hatch. On 3rd May other fully engorged female ticks were removed, several of which laid eggs, and these hatched on 28th June.

After twelve months of this experience the conclusion was drawn that spraying of cattle occupied too much time and was not sufficiently reliable to enable us to maintain the property absolutely clean; consequently, a dipping-tank was installed. The dip was charged with fluid prepared in accordance with the Department's formula, as follows:—

Commercial arsenic	8½ lb.
Caustic soda	4 lb.
Tallow	4 lb.
Stockholm tar	½ gallon.
Water	400 gallons.

The dipping-vat at working level holds 2,800 gallons, and it was charged in the following manner:—

Two thousand gallons of water were run into the dip; 59½ lb. of commercial arsenic were mixed with 14 lb. of caustic soda in the dry state and placed in a 400-gallon tank with about 20 gallons of water, the mixture being stirred for a few minutes until the ingredients boiled and the arsenic dissolved. Cold water was then added until the tank was full, when the mixture was well stirred and run into the dip. Next, 50 gallons of water were run into the tank and heated to boiling point; 14 lb. of caustic soda and 28 lb. of tallow were then added and boiled together for three-quarters of an hour. After this, cold water was gradually added, heating was continued, but the fluid kept below boiling point. When the tank was half-full, 3½ gallons of Stockholm tar were added and the mixture well stirred. Heating was continued and water gradually added until the tank was full, when the mixture was thoroughly stirred and run into the dip. The whole of the dip contents were then thoroughly stirred and used for dipping cattle.

Since the dip was charged all cattle running in the paddocks have been dipped every fourteen days, with highly satisfactory results. This operation will, although the property is now clean, be continued every fourteen days indefinitely, since the work is easily and expeditiously performed and causes no discomfort to the animals treated, either in summer or winter, while it prevents any reinfestations of the pastures that might result if any cattle picked up larval ticks near the boundary fences.

The following experiment illustrates our experience of the tick-destroying effect of the departmental mixture when applied by totally immersing the cattle in a dipping tank:—

Three steers, heavily infested with ticks of all ages, were purchased for experimental purposes, and on the 16th April, 1917, they were dipped in a fluid containing 8·6 lb. of active arsenic to 400 gallons of fluid of a high wetting power. After dipping they were immediately placed in clean stalls and kept under careful observation for several weeks. On the first, second, third, and fourth days following dipping, careful inspection showed that considerable numbers of adult female ticks were becoming fully engorged and dropping to the ground in the usual manner. Many such ticks when fully engorged and about to drop were removed and kept under careful observation, with the results detailed in the table below. On the fifth day following dipping no live ticks were found on any of the animals, and although they were kept under careful observation for several weeks no more ticks were found on them.

Of the fully engorged female ticks removed, no less than seventy-three laid eggs which varied in quantity from very few up to a full complement. However, no eggs hatched.

TABLE SHOWING THE EFFECTS OF DIPPING ON THE MORE RESISTANT ADULT TICKS.

Experiment No. 1.—On 16-4-17 sixty live ticks were removed from three steers immediately after dipping and were kept under favourable conditions as to temperature and moisture.

Date.	Day of Experiment.	No. of Ticks Dead.	Total No. of Ticks Alive.	No. of Ticks Laying Eggs.	Eggs Hatched.	Temperature.
16-4-17	...	...	60	...	...	Room
19-4-17	3	7	53	...	...	,,
23-4-17	7	...	53	1	...	,,
24-4-17	10	49	4	1	...	,,
6-5-17	20	3	1	1		,,
12-9-17	...	...	...	..	Nil	,,
...	...	...	...	.	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...

Experiment No. 2.—On 17-4-17 eighty-nine live ticks were removed from three steers twenty-four hours after dipping and were kept under favourable conditions as to temperature and moisture.

Date.	Day of Experiment.	No. of Ticks Dead.	Total No. of Ticks Alive.	No. of Ticks Laying Eggs.	Eggs Hatched.	Temperature.
17-4-17	...	...	89	...	...	Room
19-4-17	2	1	88	...	...	,,
23-4-17	6	...	88	33	...	,,
24-4-17	7	...	88	37	...	,,
23-4-17	9	16	72	46	..	,,
28-4-17	11	..	72	47	...	,,
6-5-17	19	13	59	47	...	,,
15-5-17	28	12	47	47	...	,,
7-6-17	51	...	...	...	Nil	37°C.
15-6-17	59	...	..	...	...	...
24-6-17	68	...	...	...	Nil	...
19-9-17	...	...	...	...	Nil	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...

Experiment No. 3.—On 18-4-17 seventy-eight live ticks were removed from three steers forty-eight hours after dipping and were kept under favourable conditions as to temperature and moisture.

Date.	Day of Experiment.	No. of Ticks Dead.	Total No. of Ticks Alive.	No. of Ticks Laying Eggs.	Eggs Hatched.	Temperature.
18-4-17	..	...	78	...	...	Room
19-4-17	1	6	72	...	...	,,
23-4-17	5	...	72	9		,,
26-4-17	8	29	43	18	...	,,
28-4-17	10	...	43	19	...	,,
29-4-17	11	3	40	19	...	,,
4-5-17	16	13	27	19	...	,,
6-5-17	18	2	25	19	...	,,
12-5-17	24	6	19	19	...	,,
7-6-17	40	...	...	...	...	37°J.
15-6-17	48	...	...	..	...	,,
24-6-17	57	...	...	...	..	,,
26-6-17	59	...	...	...	...	Room
19-9-17	...	...	...	...	Nil	,,

Experiment No. 4.—On 19-4-17 thirty-eight live ticks were removed from three steers seventy-two hours after dipping and were kept under favourable conditions as to temperature and moisture.

Date.	Day of Experiment.	No. of Ticks Dead.	Total No. of Ticks Alive.	No. of Ticks Laying Eggs	Eggs Hatched	Temperature.
19-4-17	...	...	38	...	...	Room
26-4-17	7	20	18	3	...	,,
27-4-17	8	...	18	4	...	,,
30-4-17	12	7	11	4	...	,,
4-5-17	16	3	8	4	...	,,
6-5-17	18	4	4	4	...	,,
19-9-17	...	...	...	...	Nil	...
.	...	.	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...

Experiment No. 5.—On 20-4-17 sixteen live ticks were removed from three steers ninety-six hours after dipping and were kept under favourable conditions as to temperature and moisture. No further ticks available from steers on 21-4-17. Animals clean.

Date.	Day of Experiment.	No. of Ticks Dead.	Total No. of Ticks Alive.	No. of Ticks Laying Eggs.	Eggs Hatched.	Temperature.
20-4-17	...	...	16	...	...	Room
26-4-17	6	8	8	...	..	,,
1-5-17	11	..	8	2	...	,,
4-5-17	14	1	7	2	...	,,
10-5-17	20	4	3	2	...	,,
14-5-17	24	1	2	2	...	,,
19-9-17	...	...	...	...	Nil	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	..	...	...	...	...	...

CONCLUSION.

There is a very striking difference in the efficacy of tick-destroying fluid according as this is applied by dipping or spraying. Spraying is so unreliable that its use for treating tick-infested or suspected cattle before travelling into clean country should not be countenanced when a suitable dip is available. If spraying is unavoidable, the cattle should be sprayed as often as necessary and held in a clean place until they are proved by the most careful inspection to be clean, and the inspector examining same should be sufficiently experienced to realise the great difficulty of detecting the presence of a very limited number of ticks, more especially when the hair is long.

F. THOMSON, Assistant Bacteriologist.
F. KEOGH, Chemist.
GEORGE TUCKER, Deputy Chief Inspector of Stock.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
M. L. Cochrane ..	Paringa Farm, near Cairns	5	21	Ayrshire Herd Book of Australia

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH SEPTEMBER TO 26TH OCTOBER, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie's Lass ...	Ayrshire ...	5 July, 1917	994	3·8	44·27	
Sweet Meadows ...	Jersey ...	8 Aug. ,,	582	5·9	40·65	
Netherton Belle ...	Ayrshire ...	17 July ,,	610	3·3	38·20	
Twylish's Maid ...	Jersey ...	26 Sept. ,,	680	4·7	37·68	
Hedge's Dutchmaid	Holstein ...	9 Sept. ,,	1,059	2·7	33·16	
Prim	,, ...	3 Aug. ,,	940	3·0	32·82	
Netherhall Queen Kate	Ayrshire ...	30 June ,,	879	3 2	32·81	
Lilia	,, ...	11 July ,,	794	3·3	30·59	
Nina	Shorthorn...	6 Sept. ,,	846	3·1	30·57	
La Hurette Hope	Jersey ...	22 Aug. ,,	492	4·7	27·25	
Miss Bell	,, ...	27 June ,,	524	4·4	27·14	
Confidence ...	Ayrshire ...	25 June ,,	633	3·7	27·0	
College Damsel ...	Holstein ...	12 July ,,	958	3·4	27·0	
Lady Mitchell ...	,, ...	26 Sept. ,,	683	3·5	26·11	
Lady Dorset ...	Ayrshire ...	14 Aug. ,,	616	3·4	24·47	
Lady Loch II. ...	,, ...	3 June ,,	575	3·6	24·26	
Thornton Fairetta	Jersey ...	30 June ,,	357	5·6	23·63	
College Bluebell ...	,, ...	28 June ,,	632	3·2	23·59	
Princess Kate ...	Ayrshire ...	28 June ,,	568	3·4	22·56	
Songstress	,, ...	1 Oct. ,,	465	4·0	21·83	
Buttercup	Shorthorn...	2 June ,,	599	3·0	20·91	
Miss Betty ...	Jersey ...	27 Mar. ,,	410	4·3	20·74	
Miss Security ...	,, ...	27 Mar. ,,	453	3·8	20·17	

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1917.

During the month broodiness has been very troublesome; in several cases as many as four birds from a pen were in the broody coops. Mr. E. A. Smith, unfortunately, had a casualty, and the dead bird has been replaced. The weather has been somewhat changeable, but on the whole the health of the birds is very satisfactory. Mr. J. M. Manson wins the monthly prize with his White Leghorns, the total being 161 eggs. As a matter of interest to poultry-breeders, the following details with regard to Mr. R. Burns's Black Orpingtons are given. "F" birds have laid as follows:—

	Eggs.		Eggs.
April 3 to April 16 inclusive	14	June 4 to June 5 inclusive..	2
„ 18 „ „ 25 „	8	„ 7 „ „ 12 „ ..	6
„ 27 „ May 2 inclusive ..	6	„ 14 „ Sept. 7 „ ..	86
May 4 „ „ 6 „ ..	3	Sept. 9 „ „ 14 „ ..	6
„ 8 „ „ 24 „ ..	17	„ 16 „ Oct. 25 „ ..	40
„ 26 „ June 2 „ ..	8	Oct. 27 „ „ 31 „ ..	5

And still laying.

PLATE 38.—"F" BIRD.

The continuous laying of 86 eggs between 14th June and 7th September and the grand total of 201 eggs in 212 days, are both records. It is unfortunate that this bird's eggs are below the standard weight of 2 oz. In fact they average only 1¾ oz. In regard to this question of weights, the following table is of interest:—Mr. Burns's

"C" bird (total 158) and "E" bird (total 171) are full sisters to his "F" bird. The average weight of eggs for "C" bird is 2¼ oz. and for

PLATE 39.—"E" BIRD

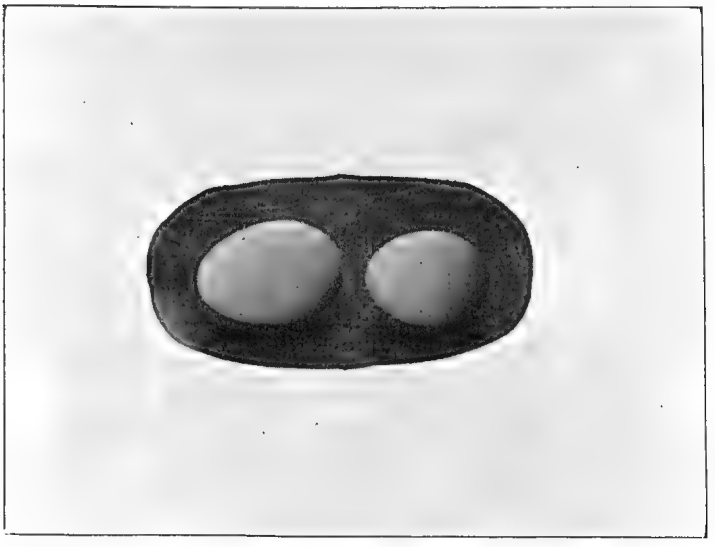

PLATE 40.—EGGS LAID BY "E" AND "F" BIRDS AT END OF OCTOBER. WEIGHT, 2⅜ OZ. AND 1¾ OZ., RESPECTIVELY.

"E" bird 2⅛ oz. Thus, in regard to the weight of egg material laid, these birds lie as follows:—

Bird.	No. of Eggs.	Average Weight of Eggs. Oz.	Total Weight. Oz.
C ..	158 ..	2¼ ..	355½
E ..	171 ..	2⅛ ..	363⅜
F ..	201 ..	1¾ ..	351¾

The record given above illustrates very forcibly the absurdity of merely buying eggs at a uniform price per dozen. Certainly a fairer

method would be to sell eggs by weight, and failing this the eggs should be graded. The following photographs show a parcel of ungraded eggs and then the same eggs separated into two grades. Unfortunately, the photograph does not show as much distinction as actually exists, but the smaller lot in the lower picture are distinctly smaller.

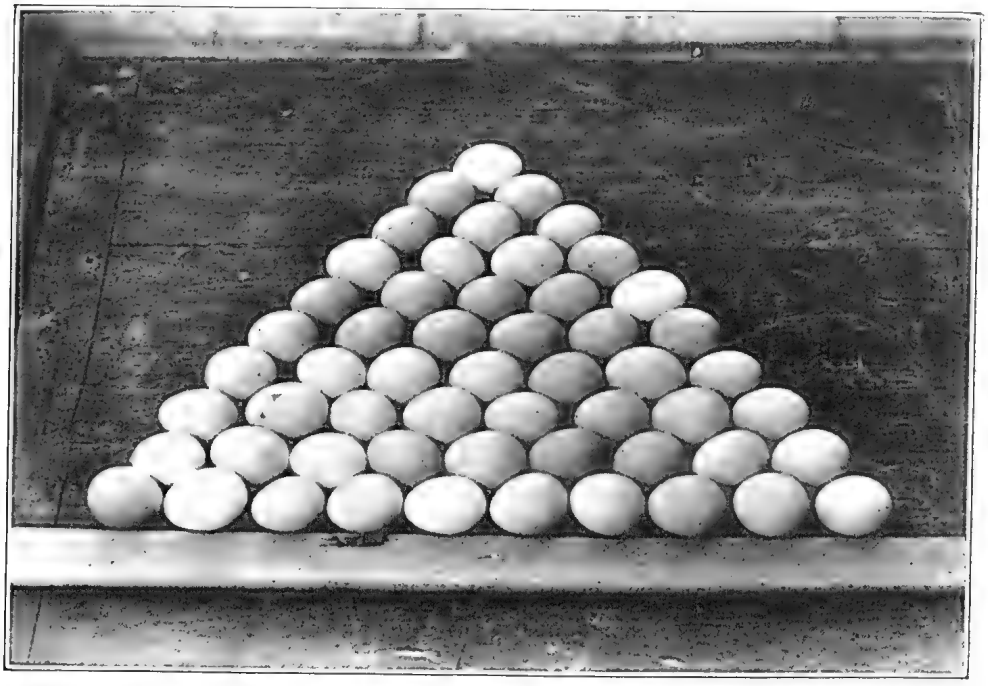

PLATE 41,—UNGRADED EGGS.

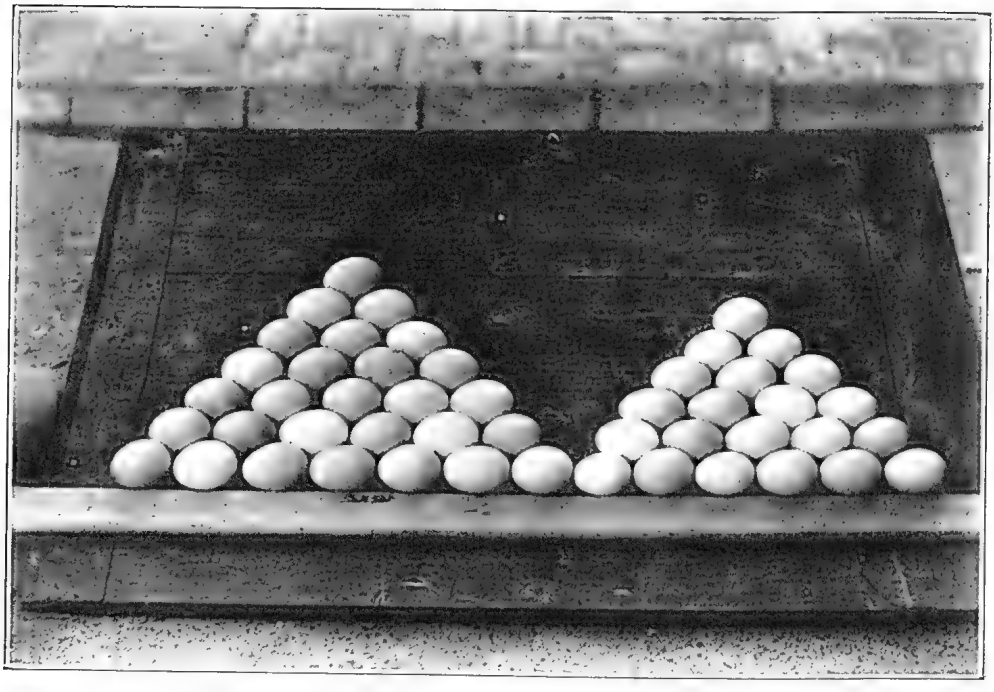

PLATE 42.—SAME EGGS SEPARATED INTO TWO GRADES.

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	October.	Total.
LIGHT BREEDS.			
E. Chester	White Leghorns ...	155	947
*G. H. Turner	Do.	133	838
G. Chester	Do.	147	826
W. Becker...	Do.	139	815
F. W. Leney	Do.	140	814
Chris. Porter	Do.	141	812
*J. M. Manson	Do.	161	803
W. R. Crust	Do.	132	796
Oakland Poultry Farm	Do.	142	789
T. A. Pettigrove, Victoria	Do. ...	127	782
Kelvin Poultry Farm	Do.	149	768
Moritz Bros., S.A.	Do.	118	766
T. Taylor	Do.	140	761
*J. Zahl	Do.	135	758
Quinn's Post Poultry Farm	Do.	127	745
*J. R. Wilson	Do.	132	744
*A. T. Coomber	Do.	139	739
A. Shillig	Do.	136	735
D. Fulton	Do.	135	732
J. G. Richter	Do.	124	731
*Mrs. J. R. D. Munro	Do.	137	716
T. B. Hawkins	Do.	116	716
A. H. Padman, S.A.	Do.	131	710
Mars Poultry Farm	Do.	111	692
*Dixie Egg Plant	Do.	147	688
*A. W. Bailey	Do.	107	686
C. Knoblauch	Do.	98	679
*T. Fanning	Do.	143	679
J. L. Newton	Do.	141	672
R. Holmes	Do.	117	667
F. Clayton	Do.	128	663
Mrs. W. D. Bradburne, N.S.W. ...	Do.	126	656
G. Howard	Do.	131	653
L. G. Innes	Do.	129	651
G. Williams	Do.	116	640
J. Holmes	Do.	135	636
E. Cross	Do.	119	634
Mrs. S. J. Sear	Do.	139	633
G. J. White	Do.	134	633
S. C. Chapman	Brown Leghorns... ...	139	626
*A. E. Walters	White Leghorns... ...	120	616
C. H. Singer	Do.	136	611
C. P. Buchanan	Do.	137	608
J. Ferguson	Do.	130	600
*C. C. Dennis	Do.	110	597
E. A. Smith	Do.	123	594
Miss M. Hinze	Do.	88	591
Mrs. J. Carruthers	Do.	107	588
*Dr. E. C. Jennings	Do.	135	545
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	140	884
W. Smith	Do.	130	826
*Mars Poultry Farm	Do.	145	816
A. E. Walters	Do.	117	814
W. S. Hanson, N.S.W.	Do.	122	755
*E. F. Dennis	Do.	141	751

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	October.	Total.
HEAVY BREEDS—*continued.*			
F. A. Claussen	Rhode Island Reds ...	106	736
Cowan Bros., N.S.W.	Black Orpingtons ...	105	684
Mrs. J. H. Jobling, N.S.W.	Do.	138	682
P. C. McDonnell, N.S.W.	Do.	110	671
D. Kenway, N.S.W.	Do.	111	668
H. Jobling, N.S.W.	Do.	116	654
*E. A. Smith	Do.	131	646
*Oakland Poultry Farm	Do.	117	621
King and Watson, N.S.W.	Do.	115	620
C. B. Bertelsmeier, S.A.	Do.	101	600
*Miss M. Hinze	Do.	125	587
E. Morris	Do.	113	587
R. Burns	S. L. Wyandottes ...	99	577
J. M. Manson	Black Orpingtons ...	113	565
*Kelvin Poultry Farm	Plymouth Rocks ...	94	557
C. C. Dennis	White Wyandottes ...	94	543
F. Clayton, N.S.W.	Rhode Island Reds ...	76	518
*F. W. Leney	Do.	81	484
Totals	...	9,122	50,227

* Indicates that the pen is engaged in the single hen test.

DETAILS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
G. H. Turner	121	132	155	149	128	153	838
J. M. Manson	143	134	117	128	130	151	803
J. Zahl	146	103	151	81	153	124	758
J. R. Wilson	143	124	119	133	105	120	744
A. T. Coomber	132	69	145	133	125	135	739
Mrs. Munro	158	107	111	109	89	142	716
Dixie Egg Plant	117	135	134	137	131	34	688
A. W. Bailey	36	114	135	136	132	133	686
T. Fanning	85	118	126	116	106	128	679
A. E. Walters	82	88	99	121	117	109	616
C. C. Dennis	115	89	48	111	115	119	597
Dr. E. C. Jennings	55	67	102	109	130	82	845
HEAVY BREEDS.							
R. Burns	123	106	158	125	171	201	884
Mars Poultry Farm	124	155	124	141	136	136	816
E. F. Dennis	139	128	141	153	154	36	751
E. A. Smith	111	104	66	143	118	104	646
Oaklands Poultry Farm	145	87	89	80	141	79	621
Miss M. Hinze	108	90	87	99	112	91	587
Kelvin Poultry Farm	85	86	89	140	62	95	557
F. W. Leney	84	84	55	76	109	76	484

Botany.

AN INTERESTING LYCOPOD (CLUB MOSS) FROM NORTHERN QUEENSLAND.

BY C. T. WHITE, Government Botanist.

Order LYCOPODIACEÆ.

LYCOPODIUM HIPPURIS, *Desv.* Spring Monogr. I. 44. Plate ???.

Description.—Shoots pendulous or erect with nutant branches, simple or repeatedly forked 1-2½ ft. long. Leaves spreading, of rather thin texture, the lower often deflexed, the higher gradually ascending, subulate-lanceolate, straight or subfalcate, 5-9 lines long and about 1 line broad, acute, entire, the base decurrent, the decurrent portion flat or longitudinally wrinkled. Sporophylla similar in shape to the barren leaves and nearly as long but the upper ones gradually becoming smaller.

Habitat: Saltwater Creek, Mossman River. *F. W. Barnard.*

Distribution.—Java and Philippines to Samoa. *V. A. V. Rosenburgh.*) A couple of years ago Mr. Barnard presented plants of this fine Lycopod to the Brisbane Botanic Gardens; the specimens are now in fine growth, and, when well grown, the species is undoubtedly one of the handsomest of our native Lycopodiaceæ. It is new to Queensland, and the above description and accompanying plate are presented, as the find is an interesting one both to botanists and horticulturists.

Lycopodium hippuris is given by Baker in the "Handbook of the Fern Allies" as a synonym along with *L. ulicilolium,* Vent. of *L. squarrosum,* Forst. The difference between these closely allied species is clearly set forth by Captain C. R. W. K. van Alderwerelt van Rosenburgh in his valuable work, "Malayan Fern Allies."

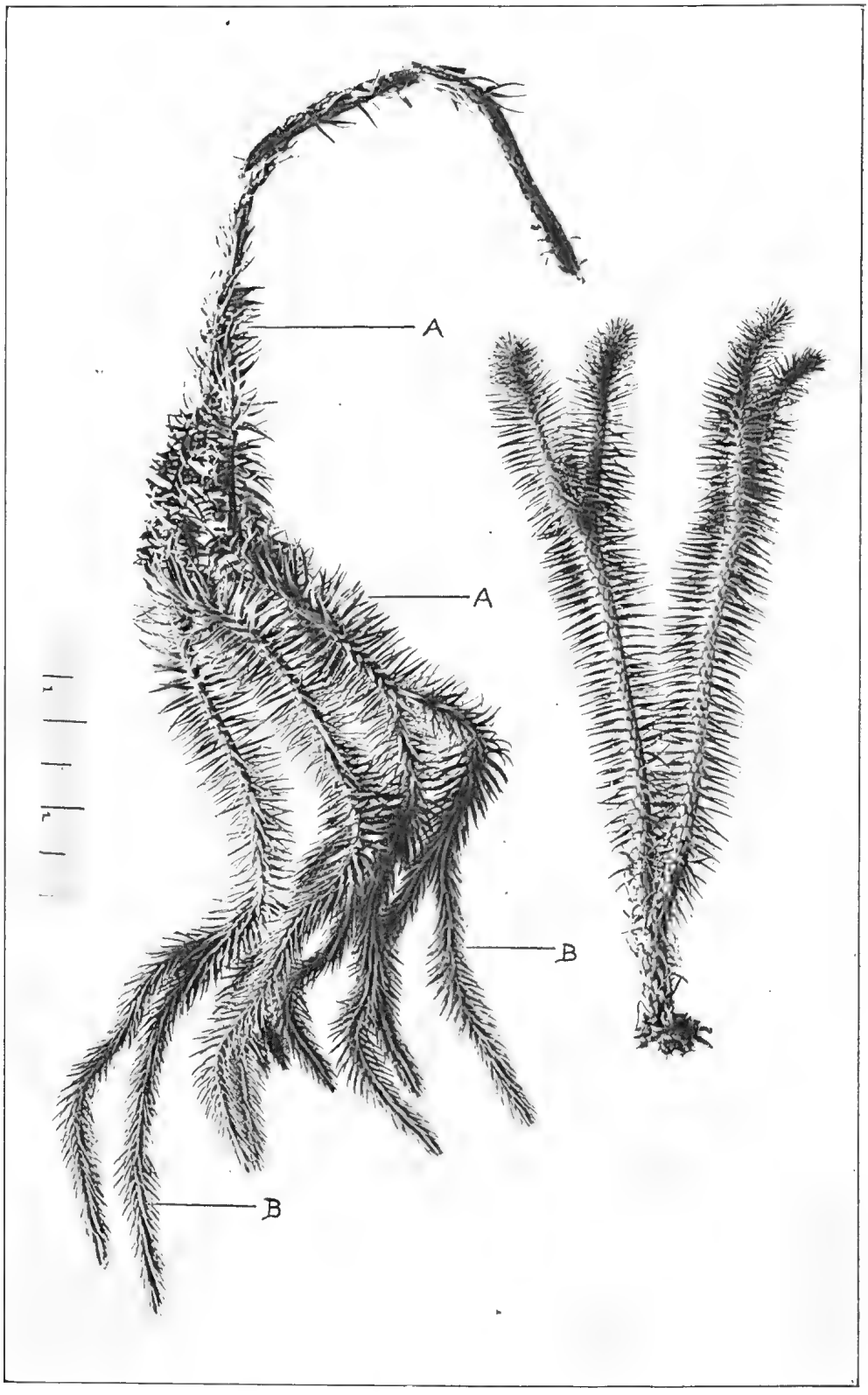

PLATE 43.—LYCOPODIUM HIPPURIS.

Left—An old pendulous shoot. Right—A young erect-growing shoot slightly nutant at the top.

A. Lower sterile portion. B. Upper fertile or spore bearing portion.

General Notes.

BREEDERS OF PURE-BRED STOCK.

In the November issue of the Journal, Mr. R. S. Alexander's stock was given as 1 male, Holstein F.H.B. of Queensland, and 2 males, Holstein F.H.B. of Australia. This should have been—

1 male; 2 females; H.F.H.B. of Australia.

SOCIETIES, SHOW DATES, ETC.

Landsborough.—Bald Knob Branch of the Queensland Farmers' Union. F. D. Young, secretary.

Proston.—Proston Progress and Farmers' Association. T. M. Stephenson, secretary.

Summit, Southern Railway Line.—The Summit Fruitgrowers' and Progress Association. B. Teale, secretary.

DRYING RHUBARB.

Experiments on an extensive scale are being carried on along all lines of drying at Iowa State College (U.S.A.). Many products are being experimented with, and as soon as results are obtained will be given to the public. So far, it has been shown that rhubarb, for instance, can be dried at home without injury to colour, flavour, or character, if the following plan is used:—

Select stalks as for immediate use; clean, peel, and cut into small pieces. Place on cheesecloth on a tray in the sun to dry. Do not let the rhubarb touch the metal. With a hot sun and little breeze, the rhubarb should dry thoroughly in about two days. If the weather turns rainy, and the atmosphere becomes saturated, apply artificial heat. This can be done in a cook stove drier if it is available. Place the trays in the drier and hold at a temperature of not over 100 degrees. Allow plenty of circulation of air. Do not dry until it becomes brittle. If no drier is at hand, hang the tray over the stove, high enough so that the temperature will not go above 110 degrees. Do not place in the oven. Circulation of air is needed to get the best results. An electric fan may be used to circulate the air. After it is thoroughly dry, put the dried product in clean sacks or other containers, and store in a clean, dry place.

When wanted for use, soak for sixteen to twenty-four hours, sweeten, and cook the same as fresh rhubarb. One ounce of the dried product makes a pint when cooked. Twenty pounds of fresh rhubarb makes 1 lb. when dried.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR NOVEMBER, 1917.

Article.		NOVEMBER. Prices.
Bacon	lb.	9½d. to 10d.
Barley	bush.	2s. 6d. to 3s. 3d.
Bran	ton	£6
Broom Millet	(no supplies)	£22 to £25
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£4 to £4 10s.
Chaff, Oaten	"	£6 to £7 6s.
Chaff, Lucerne	"	£4 to £5 10s.
Chaff, Wheaten	"	£4 10s.
Cheese	lb.	9½d. to 10d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£7 10s.
Hay, Lucerne	"	£2 10s. to £3 5s.
Honey	lb.	2½d. to 3d.
Maize	bush.	4s. 2½d.
Oats	"	1s. 6d. to 2s. 6d.
Onions	ton	£25 to £27
Peanuts	lb.	2d. to 5d.
Pollard	ton	£6 12s. 6d.
Potatoes	"	£15 5s. to £19 10s.
Potatoes (Sweet)	cwt.	4s. 10d.
Pumpkins (Cattle)	ton	£3 to £5 10s.
Eggs	doz.	5½d. to 8d.
Fowls	per pair	3s. 6d. to 7s.
Ducks, English	"	3s. 6d. to 4s. 9d.
Ducks, Muscovy	"	4s. 7d. to 6s. 6d.
Geese	"	8s. to 8s. 6d.
Turkeys (Hens)	"	12s. 6d. to 14s.
Turkeys (Gobblers)	"	20s. to 25s.
Wheat	bush.	4s. 9½d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	5s. to 7s. 6d.
Cabbages, per dozen	1s. to 5s. 6d.
Cauliflowers, per dozen	1s. to 4s. 6d.
Beans, per sugar bag	1s. 6d. to 2s.
Peas, per sugar bag	4s. to 6s.
Carrots, per dozen bunches	1s. 5d. to 1s. 6d.
Beetroot, per dozen bunches	9d. to 1s.
Lettuce, per dozen	1s. to 1s. 6d.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per sugar bag.	2s. 6d. to 2s. 8d.
Table Pumpkins, per dozen	6s. to 7s. 6d.
Marrows, per dozen	1s. to 1s. 6d.
Tomatoes, per case	1s. 6d. to 7s. 3d.
Cucumbers, per case	6d. to 1s. 9d.

SOUTHERN FRUIT MARKETS.

Article.	NOVEMBER. Prices.
Bananas (Queensland), per crate	7s. to 9s.
Bananas (Tweed River), per crate	14s. to 18s.
Bananas (Fiji), per crate	...
Bananas (G.M.), per crate	...
Guavas, per case	...
Lemons, per case	5s. to 10s.
Mandarins, per case	7s. to 14s.
Mangoes, per case	10s. to 12s.
Oranges (Navel), per case	11s. to 16s.
Oranges (Seville), per bushel case	7s.
Oranges (other), per case	8s. to 12s.
Papaw Apples, per half-bushel case	8s. to 12s.
Passion Fruit, per half-bushel case	10s.
Pineapples (Queens), per double case	8s. to 11s.
Pineapples (Ripleys), per double case	7s. to 9s.
Pineapples (Common), per double case	7s. to 9s.
Tomatoes (Queensland), per half-bushel case	6s. to 8s.
Cucumbers, per bushel	10s. to 15s.
Strawberries, per tray	1s. to 2s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	NOVEMBER. Prices.
Apples, Eating, per bushel case	20s. to 30s.
Apples, Cooking, per bushel case	10s. to 20s.
Bananas (Cavendish), per dozen	1d. to 5d.
Bananas (Sugar), per dozen	2d. to 5d.
Cape Gooseberries, per quarter-case	8s. to 10s.
Citrons, per hundredweight	11s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	4s. to 5s.
Grapes, per lb.	2d. to 7d.
Lemons (Lisbon), per case	5s. to 12s.
Mandarins, per case	5s. to 12s.
Mangoes, per case	2s. to 7s. 6d.
Oranges (Navel), per case	12s. 6d. to 14s. 6d.
Oranges (Seville), per hundredweight	3s. 6d. to 7s.
Oranges (other), per case	5s. to 10s.
Papaw Apples, per quarter-case	2s. to 3s.
Passion Fruit, per half-bushel case	12s. to 14s.
Peaches, per half-bushel case	3s. 6d to 5s.
Pears, per quarter-case	...
Peanuts, per lb.	2d. to 5d.
Pineapples (Ripleys), per dozen	1s. to 4s. 6d.
Pineapples (Rough), per dozen	6d. to 4s. 6d.
Pineapples (Smooth), per dozen	1s. to 3s. 6d.
Strawberries, per tray	1s. to 2s. 6d.
Tomatoes, per case	2s. 6d to 7s.
Watermelons, per dozen	7s. to 15s.

TOP PRICES, ENOGGERA YARDS, OCTOBER, 1917.

Animal.	OCTOBER. Prices.
Bullocks	£25 7s. 6d. to £30 15s.
Bullocks (Single)	£40
Cows	£14 to £20
Cows (Single)	£22 10s.
Merino Wethers	58s.
Crossbred Wethers	55s.
Merino Ewes	42s. 6d.
Crossbred Ewes	40s. 3d.
Lambs	39s. 3d.
Pigs (Bacon)	61s.
Pigs (Porkers)	46s.
Pigs (Suckers)	12s.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER 1917, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1917.	Oct., 1916.		Oct.	No. of Years' Records.	Oct., 1917.	Oct., 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·76	15	4·10	0·47					
Cairns	1·78	34	7·21	7·13	Nambour	3·11	20	1·77	7·82
Cardwell	1·87	44	8·00	2·18	Nanango	2·33	34	1·97	5·87
Cooktown	1·13	40	1·28	2·94	Rockhampton	1·80	29	1·53	4·09
Herberton	0·94	29	1·19	0·85	Woodford	2·69	29	1·09	5·34
Ingham	1·56	24	1·95	1·15					
Innisfail	2·74	35	5·04	14·14					
Mossman	5·04	5	4·99	10·29	*Darling Downs.*				
Townsville	1·23	45	0·37	2·57					
					Dalby	2·14	46	1·22	3·57
					Emu Vale	2·45	20	2·72	2·45
Central Coast.					Jimbour	1·89	28	0·96	3·54
					Miles	2·03	31	2·78	2·19
Ayr	0·94	29	0·32	1·16	Stanthorpe	2·66	43	2·87	3·36
Bowen	1·09	45	0·51	1·21	Toowoomba	2·69	44	2·92	4·11
Charters Towers	0·70	34	0·70	0·42	Warwick	2·35	29	2·57	2·15
Mackay	1·99	45	0·82	4·04					
Proserpine	1·65	13	1·02	5·94					
St. Lawrence	1·79	45	3·13	6·15	*Maranoa.*				
					Roma	1·76	42	1·39	2·04
South Coast.									
					State Farms, &c.				
Biggenden	2·20	17	1·20	6·12					
Bundaberg	2·08	33	2·39	5·81					
Brisbane	2·70	66	1·58	3·30	Bungeworgorai	1·42	5	1·86	1·90
Childers	2·08	21	1·68	6·10	Gatton College	2·46	17	1·21	2·93
Crohamhurst	3·79	25	1·67	6·04	Gindie	1·36	17	0·05	2·39
Esk	2·42	29	2·86	3·06	Hermitage	2·06	10	2·39	1·92
Gayndah	2·38	45	1·51	6·71	Kairi	1·22	5	3·35	1·32
Gympie	2·76	46	0·56	5·59	Kamerunga	1·56	26	3·30	4·99
Glasshouse M'tains	3·00	8	1·55	5·67	Sugar Experiment Station, Mackay	1·69	19	...	6·08
Kilkivan	2·78	37	0·56	4·23	Warren	2·34	5	1·19	4·59
Maryborough	2·74	45	1·79	5·70					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·2	5·34	5·29	5·47	4·59	6·5	4·46	6·28
2	6·1	5 34	5·28	5·48	4·58	6·6	4·46	6·28
3	6 0	5·35	5 27	5·48	4·58	6 7	4·46	6·29
4	5·59	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·58	5 36	5·25	5·49	4·57	6·8	4·46	6·31
6	5·57	5·36	5 24	5·50	4·56	6 9	4·46	6·32
7	5·55	5·36	5·23	5·50	4·55	6·9	4·46	6·32
8	5·54	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·53	5 37	5 20	5 51	4·54	6 11	4 47	6 33
10	5·52	5·38	5·19	5·52	4 53	6·11	4 47	6·34
11	5·51	5·38	5·18	5·52	4·52	6·12	4·47	6 34
12	5·50	5·39	5 17	5·53	4·52	6·13	4·47	6 35
13	5·49	5 39	5·16	5·53	4·51	6·14	4·47	6·35
14	5·48	5·40	5·15	5·54	4 51	6·15	4·48	6·36
15	5·47	5·40	5.14	5 54	4·50	6·16	4·48	6·36
16	5·45	5·41	5·13	5·55	4·50	6·17	4·48	6·37
17	5·44	5·41	5 12	5·55	4·49	6·18	4·48	6·38
18	5·43	5·42	5·11	5·56	4·49	6·19	4·49	6 39
19	5·42	5·42	5·10	5·56	4·48	6·19	4·49	6 40
20	5·41	5·42	5.9	5·57	4·48	6·20	4·50	6·40
21	5 40	5·43	5·8	5·57	4·47	6·21	4·50	6 41
22	5·39	5·43	5·7	5·58	4·47	6·22	4 51	6·42
23	5·37	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·36	5·44	5·5	5·59	4·47	6·23	4·52	6 43
25	5·35	5·45	5·4	6·0	4·47	6·24	4·52	6·43
26	5·34	5·45	5 3	6·0	4·46	6·24	4·53	6·43
27	5 33	5·45	5·3	6·1	4·46	6 25	4·53	6·44
28	5·32	5·46	5 2	6·1	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6 2	4·46	6·26	4·55	6·44
30	5 30	5·47	5 0	6 3	4·46	6·27	4·56	6 45
31	...	...	5·0	6·4	4·46	...	4·57	6 45

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
1 Sept.	○	Full Moon	10	28	p.m.
8 „	☽	Last Quarter	5	5	„
16 „	●	New Moon	8	28	„
24 „	☾	First Quarter	3	41	„

The Moon will be at its greatest distance from the earth at midnight on the 14th, and at its least distance on the night of the 30th.

1 Oct.	○	Full Moon	6	31	a.m.
8 „	☽	Last Quarter	6	14	p.m.
16 „	●	New Moon	12	41	„
24 „	☾	First Quarter	12	38	a.m.
30 „	○	Full Moon	4	19	p.m.

The moon will be furthest from the earth on the 12th, and nearest to it on the 28th.

7 Nov.	☽	Last Quarter	3	4	a.m.
15 „	●	New Moon	4	28	„
22 „	☾	First Quarter	8	29	„
29 „	○	Full Moon	4	41	„

The Moon will be furthest from the earth on the 9th, and nearest to it on the 24th.

7 Dec.	☽	Last Quarter	12	14	a.m.
14 „	●	New Moon	7	17	p.m.
21 „	☾	First Quarter	4	7	„
28 „	○	Full Moon	7	52	„

The Moon will cause an *Annular Eclipse* of the *Sun* on December 14th, but it will not be visible in Queensland. On the 28th there will be a *Total Eclipse* of the *Moon* between 7.38 and 7.55 p.m. It will be partly eclipsed for an hour and a-half before and after totality.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November, may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish Blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish, for autumn and winter use. Sow celery in shallow, well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle lift them gently one by one with a knife or a zinc label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Then keep a sharp lookout for slugs and caterpillars. Keep a supply of tobacco dust on hand, and scatter this in the path of the slug, and he will cease from troubling you.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight, and will afford light and profitable work for girls with spare time on their hands.

An exhaustive booklet on "Flower Gardening for Amateurs" has been issued by the Department of Agriculture and Stock, and may be obtained from the Office. Price, 2s.

Orchard Notes for January.

THE SOUTHERN COAST DISTRICTS.

The fruit of the month in this part of the State is the grape, and its gathering and marketing will occupy the attention of growers. Care should be taken to cut the fruit when cool and dry, and if it has to be sent any distance the stems of the bunches should be allowed to wilt before the fruit is packed, as the berries will then hang on to the bunch better, and the bunch carry in better order. Select the fruit carefully, grade it, and pack firmly so that it will not bruise in transit. If to be sent long distances, pack in crates holding from four to six 6-lb. baskets. Pines will be ripening in quantity towards the end of the month. Gather before fully coloured, and, whether for Southern or local markets, pack and handle carefully to prevent bruising. Do not ship the fruit too green for the Southern markets, as doing so is apt to spoil the trade. Send good fruit to the canneries. Small pines and crippled fruit are no good to canners, and the sooner our growers realise that it only pays to grow good fruit the better for them and for the canners, as if the latter cannot get good fruit it is impossible for them to put a line of goods that will not only be a credit to the State, but for which a world-wide market can be obtained.

Passion fruit should not be allowed to lie about for days on the ground before gathering, as if so they are apt to become fly-infested.

Watermelons and rock melons are still in season.

Watch any late peaches, Japanese plums, or other fruits liable to be infested with fruit-fly, and gather and destroy all infested fruit, or, better still, grub the trees out and burn them, as they only breed flies to destroy more valuable fruit. Mangoes will be ripening during the month. See that all fly-infested fruits are destroyed, as they will only breed up further crops to destroy later ripening fruits.

Citrus orchards can be cyanided during the month for scale insects, and spraying for Maori with the sulphide of soda wash should be continued where necessary.

Mangoes can be budded during the month, as well as citrus and deciduous trees. Tropical fruit trees can be transplanted, taking care to choose dull weather and to cover same from the direct rays of the sun till they have become firmly established. Pines and bananas can still be planted.

THE TROPICAL COAST DISTRICTS.

See that all bananas are covered with netting, as the fly is usually at its worst at this time of year.

Mangoes will be going off. See that they are not allowed to remain about on the ground to breed flies for the autumn crop of oranges. Longan, litchi, and other fruit are in season. As the month is often a very wet one, little cultivation can be done in the orchards. Strong undergrowth should, however, be kept down with a hoe or scythe. Tropical fruits of all sorts can be planted. Look out for Maori on citrus fruits, and spray when necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Stanthorpe district, apples, pears, plums, peaches, and nectarines being in season. Do not gather the fruit too immature; at the same time, don't allow it to be over-ripe. Gather dry, handle carefully, grade and pack in attractive cases. Keep the fruit as cool as possible, and ship in well-ventilated cars. Keep a sharp lookout for fruit-fly, and take every possible means to prevent its spreading, even going as far as to gather and destroy the whole of the fruit on any infected trees, as if kept in check during the month the bulk of the fruit ripening during February will be free.

Keep a sharp lookout also for codling moth; examine the bandages on the trees at least every ten days, and destroy all larvæ found therein; also gather and destroy all moth-infected fruit.

Gather Bartlett pears as soon as they are large enough, and store away in a cool shed to ripen; when they show signs of ripening, market, not before. If sent down green they will sell for cooking, and only fetch a small price. The right stage at which to gather is when the fruit is fully developed, and the flesh has lost its woody flavour, but is still quite hard. This is usually before the fly has stung it, and if gathered at this stage the fruit will ripen up properly without shrivelling, and develop its full flavour.

These remarks apply also to the Downs country, which is somewhat earlier than Stanthorpe.

The crop of the month in the Western tablelands is the grape; and the remarks I have made respecting this fruit when grown in the Southern Coast districts apply equally here. The fruit should be gathered dry, and wilted before it is packed. Too large cases are often used; cases holding from 20 to 30 lb., or crates holding six 6-lb. baskets, are preferable, the latter being the best package for shipping the fruit long distances. Keep the orchards well cultivated, and, where water for irrigation is available, give citrus trees a watering during the month, unless there has been a sufficient rainfall. When the orchard is irrigated, see that thorough cultivation follows the irrigation, so as to conserve the moisture in the soil.

Red Scale, which is prevalent on citrus trees in the dry Western country, should be treated during the month. Cyaniding is the best remedy.

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